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The improved amaryllis, with blossoms nearly a foot across and of great brilliancy

NEW CREATIONS IN PLANT LIFE

AN AUTHORITATIVE ACCOUNT OF THE LIFE AND WORK OF LUTHER BURBANK

BY

W. S. HARWOOD

SECOND EDITION, REVISED AND ENLARGED

New York

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To My Wife

Knight, also, invariably succeeded in budding the Walnut, by using the minute buds that are found at the base of the annual shoots of this tree, and which, as he says, "are almost concealed in the bark, and which rarely, if ever, vegetate, but in the event of the destruction of the large prominent buds which occupy the middle and opposite ends of the annual wood." These he inserted on yearling stocks which grew in pots, whose vegetation had been retarded by being kept during the spring and early summer in a cold northern exposure, until the small buds above mentioned were formed on the current year's shoots of the trees intended to be propagated, when the pots containing the young plants were "brought into a forcing-house and there budded."

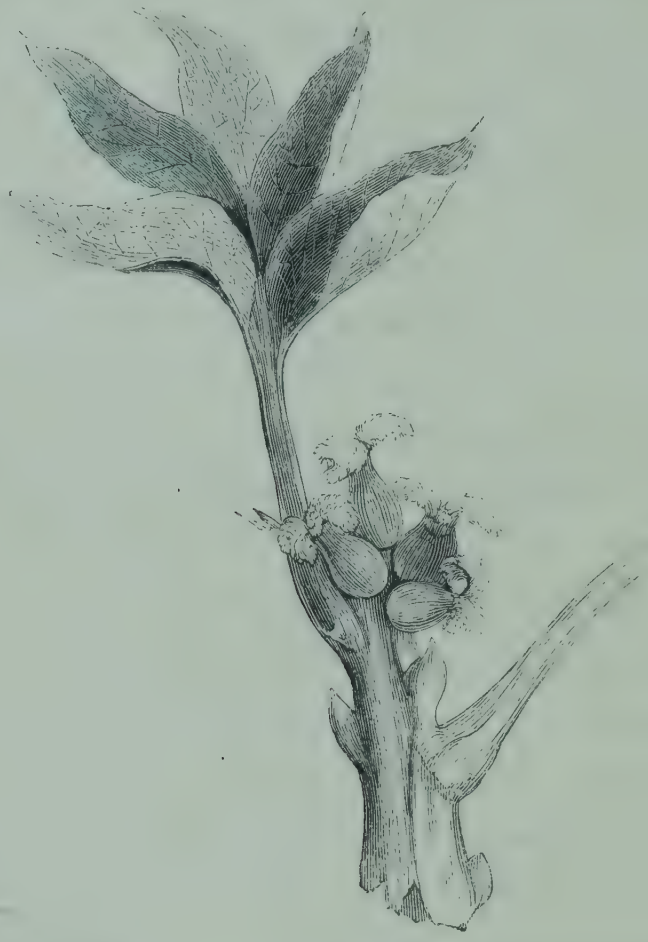
No tree requires less pruning, from its earliest age to its full developement, than the Walnut, and, except for the shortening of over rampant and ill-balanced branches, the knife ought never to be used; close pruning, or abscision by the stem, is invariably injurious, and we have repeatedly observed, when this has been done, that a decay, to a greater or less extent, always took place at the lower edge of the wound, in consequence of its slow cicatrization, and the sporting of Britain[illegible] wood.

The soil in which [illegible] and attains its greatest dimen[illegible] dry-bottomed loam, [illegible] they are free fro[illegible] the fruit has the bes[illegible] the trees grow [illegible] rocks."

In addition [illegible] in the "[illegible] at [illegible]

ference of trunk nine feet two inches, at one foot from the ground.

The specific characters of the Common Walnut are



leaflets from five to nine, but generally seven in a leaf, glabrous, obscure[ly] [to]othed, of an oval form. Nut oval and rather [com]pressed.

The [ma]le flowers appear in th[e] [Ma]y; in the north, ra[rely].

[Th]e foliage of the [tre]e have only de- [cid]uous of another small [ge]nus.

[Th]ey appear to be

Jug. r. maxima, with fruit double the size of that of the species. The nuts ought to be eaten in a fresh state, as the kernels shrink up to half their size, when dried. The leaves of this kind are very large, and the tree is highly ornamental, but its timber is inferior to that of the Common Walnut.

Jug. r. serotina. Where frosts continue late in spring this is a valuable kind, as it does not come into leaf before the end of June, and yet the fruit ripens nearly as early as that of the other varieties.

Jug. r. tenera, Thin-shelled Walnut. The nuts of this variety have a very thin, tender shell, are fine flavoured, keep longer, and produce more oil than any other kind; but the trees are generally less prolific. The names of several other less approved varieties may be obtained from the *Bon Jardinier* and the fruit catalogue of the Horticultural Society.

None of the American Walnuts, or hickory trees, have been long enough introduced, or planted to such an extent in England, as to entitle them to a place in the present work. Most of them produce valuable timber, particularly the *Juglans nigra*, American Walnut, a considerable quantity of which is now imported into Britain.

Nat. Ord. Salicaceæ.

Genus *Salix*, Linn. Linn. *Syst. Diœcia Diandria.*

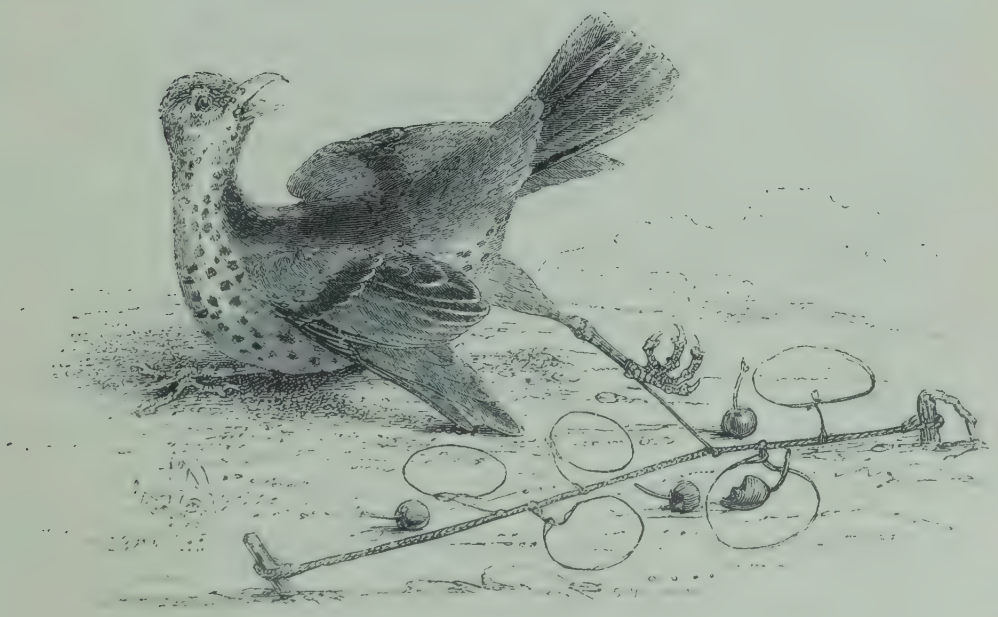
THE WILLOW.

Of this very extensive, and, to the botanist, difficult and puzzling genus, the only British species admissible into the present work, being such as attain the size of trees of the first and second ranks, and produce valuable timber, appear to be the four following :—1st. *Salix fragilis*, Crack, or Red wood Willow ; 2nd. *Salix Russelliana*, Duke of Bedford's Willow ; 3rd. *Sal. alba*, White-tree, or Huntingdon Willow ; and, 4th., *Sal. caprea*, the Goat-Willow, or Saugh. The two first of these belong to Borrer's 5th group, or *Fragiles*, as exemplified in Loudon's " Arboretum Britannicum ;" the third to the 6th group, or *Albæ*, of Borrer ; and the fourth to the 16th group, *Cinereæ*, of the same author. We might perhaps be justified in adding that beautiful exotic species, introduced, it is supposed, upwards of a century ago, the *Salix Babylonica*, Weeping Willow, which, under favourable circumstances, in the southern and midland parts of England, attains a considerable size, or that of a tree of the second magnitude ; but, as it is only cultivated for its ornamental and classic effect in landscape and picturesque gardening, and not for its timber, which is valueless, we have omitted it in our list. Of the other British species, amounting, according

to some botanical authors, to nearly seventy, while others reduce them to about thirty, a few, when trained and attended to in their growth, reach the size of small trees of from twenty to thirty feet high; such are *Sal. triandra*, *Sal. pentandra*, *Sal. acutifolia*, *&c.*; the majority, however, are of humble growth, and under the name of osiers are valuable when cultivated, producing the material used in the fabrication of all kinds of basket and wicker-work.*

The generic characters are, flowers of each sex with entire bracteas. Male flower generally consisting of 1—5 stamens, sometimes more, with one or more glands inserted contiguously to the stamens. Female flower, a pistil stalked, or sessile with one or more glands inserted contiguously to it. Leaves in most species, with the disk more or less lanceolate.

* For further information respecting this interesting genus, the uses to which the species are applied, their culture, &c., we must refer our readers to the "Arboretum Britannicum," where they will find a comprehensive digest of all that has been written upon the subject.



Salix fragilis. Linn.

THE CRACK, OR RED-WOOD WILLOW.

Salix fragilis,

Linn. sp. pl. 1448.
Smith's Eng. Flor. 4. p. 185.
Hooker's Brit. Flo. p. 421. ed. iii.
Mackay's Flo. Hibern. p. 246.

On referring to the botanical and arboricultural writers who have treated of this tree, we find a remarkable discrepancy of opinion existing among them, as to the quality

and properties of its timber. By Sir J. E. Smith, in the "English Flora," its wood is stated to be of little value, and that whatever economical or medical uses have been attributed to it, belong to another species (*S. Russelliana*). On the other hand, Mr. Matthew, in his able treatise on naval timber, asserts its excellence and the valuable properties it possesses for this specific and important purpose: "the use (he says,) of the Red-wood Willow as timbers of vessels has been of long standing in this part of Scotland,* and has proved its endurance and excellent adaptation;" and, he further adds, "by reason of its lightness, pliancy, elasticity, and toughness, it is, we think, the best without exception for the formation of small, fast-sailing war vessels." This high estimate of the wood of the *Salix fragilis*, coming as it does from one who has seen its properties tested and had experience of its value, outweighs, in our opinion, that of the scientific botanist, who probably had never personally examined, or made trial of its qualities, but had taken, without further inquiry and as correct, the common opinion entertained in many parts of its worthlessness, the despised withy having generally been left to rot where it grew, without an attempt to ascertain its properties, or, as a timber, to convert it to any useful purpose. Important as it may be in a naval point of view, its timber is not less useful in various other ways; from the author already quoted we learn that, for the main timbers or roofing of houses, it furnishes a very durable material; those of a house he mentions formed of it, and which had stood for upwards of a century, were found, with the exception of the outside to the depth of scarcely half-an-inch, perfectly sound, "still fit for any purpose, of a beautiful pink or salmon colour." It is also

* The eastern coast of Perthshire and Bannffshire.

valuable for the repairing of mill wheels, forming excellent wash boards. It also furnishes as good a plank for the lining and bottoms of stone carts, as any other tree of the Willow or Poplar kind; and for all country uses, where a tough, strong, and, at the same time, a light material is required, cannot be surpassed, and we believe, from its grain and colour, it would make very handsome, light, and durable furniture.

This Willow is found distributed throughout the greater part of Britain, but more prevalent in some parts than others. It flourishes upon the banks of rivers, canals, and ditches, and seems to affect a soil rather stiff than otherwise, and we have seen it attain a very considerable size upon cold, damp, clayey soils. On this account we recommend it, if wanted for its timber, to be planted as a hedge-row tree, and also in belts and plantations in upland districts, where the soil is stiff and of moderate quality, as it is likely with some of its congeners to become valuable, both for the shelter and timber it affords, long before the ash, elm, or any other of the slower-growing trees would attain the size of ordinary poles. In its foliage it bears a strong resemblance to the *Sal. Russelliana*, but its growth is different, the ramification being more oblique and the branches in consequence rather crossing each other. It is also less beautiful and imposing in appearance, and seldom attains so great a size. It is very subject to become naked or stag-headed, by the decease of its uppermost branches, though it continues to live, and throw out long annual shoots for many years afterwards; this renders it unsightly, and, as an ornamental species, very inferior to the *Sal. Russelliana*, or the *Sal. alba*. The cause of this canker, analogous apparently to that which attacks so many of our apple and pear trees, has not been satis-

factorily ascertained, and it is still a matter of conjecture whether it is to be attributed to the soil, or to an inherent taint in the slips or cuttings by which it is usually propagated.

When first cut the sap wood of the Crack Willow is white, the heart pale red; upon exposure to the air, and when seasoned, both become of a fine salmon colour. The bark is bitter and contains a large proportion of tannin, as well as a bitter principle termed salacine, akin in its properties to quinine. The roots afford a purple red dye, and are still used in Sweden and in France to colour the Paschal or Easter eggs, a use to which they were also formerly applied in Scotland.

The larvæ of several nocturnal lepidoptera feed upon the leaves of this as well as other willows; among them we have found those of *Cerura vinula*, *Notodonta ziczac*, and *Smerinthus populi*.

Salix Russelliana. SMITH.

RUSSELL, OR DUKE OF BEDFORD'S WILLOW.

Salix Russelliana, SMITH's Flo. Brit. 1045. Id. Eng. Flor. v. 4. p. 186.
FORBES in Sal. Wob. No. 28.
HOOKER's Br. Flo. p. 421. ed. III.
MACKAY's Flor. Hibern. p. 246.
LOUDON's Arb. Brit. ch. ciii. p. 1517.

THE specific characters of this Willow, as given by botanical authors, are as follows. Leaves lanceolate, tapering at each end, serrated throughout, and very glabrous.

Footstalks glandular or leafy. Ovary tapering, stalked, longer than the bracteas. Style as long as the stigma.

The male, according to Dr. Johnston, has the catkins two inches long, on short leafy branchlets, cylindrical, yellow, diandrous, the filaments not much longer than the pointed, more or less villose scales.

With a foliage considerably resembling that of *Sal. fragilis*, but lighter and more airy in appearance, the Bedford Willow exhibits, when fully grown, a much freer and finer outline, in consequence of the different or more obtuse angle at which its branches issue from the stem. It is a tree of very rapid growth, nearly equalling in that respect the *Sal. alba*, and attains in favourable soils a size superior to that of *Sal. fragilis*. Of the specimens mentioned by authors, the favourite tree of Dr. Johnson, belonging to this species and growing near Lichfield, appears to have been one of the largest, and in 1812, a few months previous to the first injuries it received from the elements, its dimensions were as follow: girth at six feet from the ground twenty-one feet, the length of the stem below the ramification which formed the enormous head, twenty feet; three years afterwards it had lost the greater part of its boughs, and in 1829 it was blown down by a violent storm, which took place on the 29th of the April of that year. We lately measured a tree of this species growing at Dunstan Hill, near Newcastle-on-Tyne, ten feet in circumference at the base; but the length of the stem is not more than eight feet, at which height three or four

enormous limbs branch out and form a lofty and wide-extended head.

The Bedford Willow appears formerly to have been confounded with the *Sal. fragilis*, or considered as a variety of that species, and it was not till the commencement of the present century that its distinctive characters were pointed out, and the appropriate name of *Russelliana* given to it, the late Francis, Duke of Bedford having been the first to bring it into notice, and point out the valuable properties it possesses as a timber tree.

The wood of the Bedford Willow is of a quality fully equal to that of *Sal. alba*, being tough, elastic, and durable, though perhaps not more so than that of *Sal. fragilis*, which species, however, it generally exceeds in scantling, when grown together upon ground of the same quality. It forms strong and durable joists and main timbers for buildings, and makes an excellent flooring for manufactories, &c., not splitting by any sudden shock, and, like the wood of the poplars, being of slow combustion and difficult to set on fire. Its tough and strong lateral adhesion makes it an excellent lining for stone carts and barrows, and, in the neighbourhood of stone and lime quarries, we have known the wood of this and the White Willow to sell at as high a price as five shillings per cubic foot.

It thrives and attains its greatest developement in a moist soil of good quality, but not where water is stagnant. It also produces good timber and of a tolerable scantling upon inferior and clayey soils, and is by no means of a tender or delicate constitution. It is, therefore, a profitable tree to plant upon exposed uplands in company with *Sal. alba*, *Sal. fragilis*, and other trees, and we strongly recommend it as certain to make a speedy and

profitable return to the planter. When grown in company, or planted in mass, the side branches are kept small, and do not interfere with the growth of the main stem of the tree; it therefore runs up to a great height, with a clean straight trunk, and is thus rendered fit for many purposes to which, when grown as a single or hedgerow tree, it is seldom applicable. At Twizell, about sixteen years planted, it is upwards of forty feet high, with a straight stem, measuring three feet ten inches in circumference at one foot from the ground. At Tallowden, the seat of General Sir H. Grey, there are some fine examples of this tree, averaging upwards of sixty feet in height, and about eight feet in girth.

From experiments that have been instituted, it appears that the bark of the Bedford Willow contains, in a given quantity, a greater proportion of tannin than that of the oak; this ought to render it as valuable to the tanner as the bark of that tree, but we do not find that it is much sought after or in demand, at least such is the case in the north of England. This, however, may arise from its superiority not being generally known to the trade, though we apprehend that a mistaken prejudice, and an unwillingness to make trial of a new material, (however good it may be,) because it is new, may have their effect in preventing its general application. Most of the insects and larvæ which feed upon the *Sal. alba* are also found upon this tree.

Salix alba. Linn.

WHITE, OR COMMON HUNTINGDON WILLOW.

Salix alba,

Linn. sp. pl. 1449.
Smith's Eng. Bot. 1230. Id. Eng. Flo. v. 4. p. 231.
Forbes in Sal. Wob. No. 136.
Hooker's Brit. Flo. ed. iii.
Mackay's Flo. Hibern. p. i. p. 247.
Loudon's Arb. Brit. ch. ciii. p. 1522.

In this species the leaves are lanceolate, serrated, the lower serratures bearing glandules, both sides covered with adpressed silky hairs, giving the foliage a whitish appear-

ance. Stamens hairy, two to a flower, the ovary glabrous, flowers loosely disposed in the catkin. This species, which may justly be considered the finest, and perhaps the most elegant of the tree Willows, grows naturally to a very great size, with an outline, very frequently, of imposing elegance and picturesque effect, and which, as Gilpin observes, fits it to appear in any rural scene. Such is its effect where it is left to its free growth, and where the disfiguring custom of pollarding, so common in the fenny parts of England, is either unknown or rarely practised. In the north of England and Scotland, where mineral fuel is cheap and plentiful, and no necessity exists for the trimming and pollarding system, very fine examples of this tree are often met with, and, when growing in an appropriate situation, such as on the banks of a river, the margin of a purling brook, or in one of our low, sheltered, and sunny haughs, it forms a beautiful and interesting feature, its silvery and plume-like foliage giving an air of lightness and grace to the landscape, and producing, by its contrast with foliage of a deeper tint, that effect so agreeable to those who view such scenes with the eye and feeling of an artist.

Hitherto the *Sal. alba* as well as the *Sal. Russelliana* do not appear to have been cultivated to the extent they so well deserve, considering the value of their produce, and that they make a more rapid and profitable return to the

planter than almost any other tree, the larch always excepted.

The White Willow has also the advantage of thriving, and growing to a large size, upon land of secondary quality, though it no doubt attains its finest developement in a rich moist soil. We have seen it, indeed we have many promising young trees growing rapidly upon a stiffish clay, where it has been well drained of stagnant water. It is therefore well calculated for plantations in poorish upland districts, and we would recommend it, together with the *S. Russelliana*, to be freely inserted where such are made, particularly in hollows near water-courses, or at the bottom of declivities where the soil is moist: thus planted, in company with other trees, or in masses by itself, the Willow makes astonishing progress, and soon reaches a

great height, with a clean straight stem, rendering it fit for a great variety of purposes where length of solid timber or planking is required. Its growth is very rapid, the annual increase of timber in trees of between twenty and thirty years old, having been found to be at the rate of one cubic foot and a half; such appears to be the result of the measurement of five trees at Woburn Abbey, the particulars of which are detailed in the "Arboretum Britannicum," and we find that a similar increase took place in willows of this species planted by Mr. Gorrie on the northern bank of the carse of Gowry in Perthshire. At Twizell, in Northumberland, upon soil of moderate quality, being a stiffish loam, its growth has been equally rapid, and we have just measured a tree planted about eighteen years ago, whose height is upwards of fifty feet, with a trunk six feet four inches in circumference at two feet from the ground; others growing near to this individual are loftier, but none of them equal it in girth, the two next being, the one five feet four inches, the other four feet six inches in circumference.

The simple, and at the same time the very cheap mode of propagating the Willow is also another great advantage attending its cultivation, for all that is required to form a plantation is to take cuttings of wood one or two years old from a foot to two or more in length, and plunge them to the depth of eight or ten inches into the soil; stakes also of a larger size, or from six to eight feet long, and from two to three inches in diameter, succeed very well, and are recommended by Mr. Gorrie; but having tried both methods, we prefer the smaller cuttings, and think our finest trees are from these.

As a hedge-row tree the White Willow succeeds very well in low and sheltered districts, attaining a great size,

and presenting the appearance of a wide-spreading tree, the stem seldom reaching to any great height before it divaricates, and throws out great limbs which form the head. In exposed and upland situations it is unable, when planted singly, to resist the force of the prevailing winds, and in consequence generally deviates more or less from the perpendicular, and is liable, in heavy storms of wind, to have its limbs broken or torn from the stem.

The wood of the *Salix alba* is similar in texture and quality to that of *Russelliana*, and adapted for like purposes, making excellent sheathing for stone carts, barrows, &c., and when grown in mass, or in company with other trees, affords clean and durable joists and rafters for buildings; it is also used in mill-work, and by the turner and cooper. At a younger age, or as a coppice wood, it produces hoops, light handles for hay-rakes, hoes, and other implements, and the twigs are used in basket-making and other wicker-work. Willow-wood is also used when split into fine lamina, to weave or work into light hats and bonnets, and the woven material is the foundation upon which the light silk hats, now so generally in use, are moulded.

Its bark contains a large portion of tannin, but is not in great demand or appreciated by the tanner as it would seem to deserve, nor is it used to nearly the same extent in England as it is in other parts of the north of Europe.

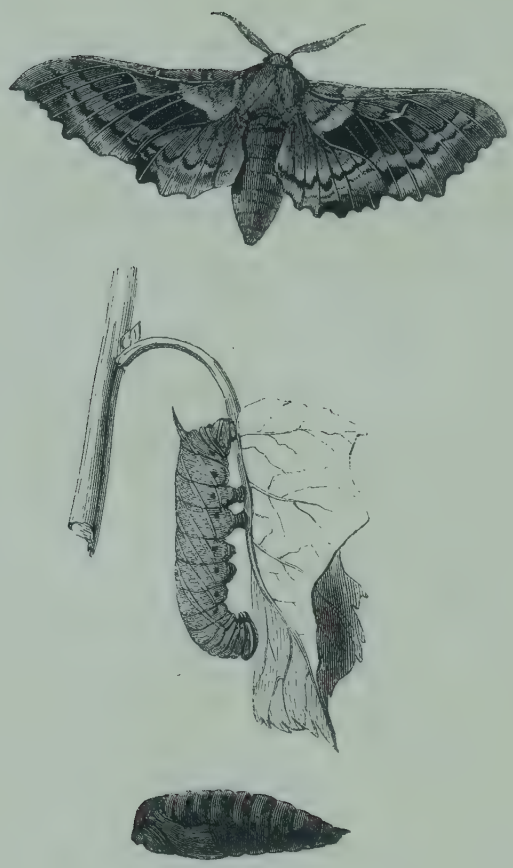
In Sweden, and other high latitudes, where the seasons are uncertain, and scarcity is often felt, in consequence of the failure or imperfect ripening of the corn crops, the inner bark of this species, as well as that of the Scotch fir *(Pinus sylvestris)*, is frequently made into a bread, being first dried, then ground into a fine flour, and mixed with a certain proportion of oatmeal. Loudon informs

us that in France "a fine blood-red colour is obtained from the bark which is also used in the preparation of leather for making gloves."

The species is widely spread throughout Europe, possessing a range from Norway to the Mediterranean, and is also a native of the north, east, and west, of Asia.

The foliage of the Willows, and among the rest that of the present species, is the food of the larvæ of numerous lepidopterous, coleopterous, and hymenopterous insects; among those of the Lepidoptera we have observed most of the following, *Smerinthus populi*, and *ocellatus*, *Clostera reclusa*, and *curtula*, *Cerura furcula*, *arcuata*, and *vinula*, *Notodonta ziczac*, *Leiocampa dictæa*, *Leucoma salicis*, *Orthosia sparsa*, and *lota*, *Calyptra libatrix*, *Bombycia viminalis*, *Zanthia aurago*, *Cabera pusaria*, *Cidaria salicata*, &c. The ravages of some larvæ are not, however, confined to the leaves, for the wood itself is bored into and fed upon by the caterpillar of the Goat Moth, *(Cossus ligniperda)*, and we have had young trees attacked and *riddled*, as it were, by the grub of the *Cryptorynchus lapathi*, a coleopterous insect belonging to the Curculionidæ or Weevil tribe, and whose habits and depredations are noticed and accurately described by Mr. W. Curtis, in the 1st. vol. of "The Linnean Society's Transactions." At the period of flowering, Willow trees swarm with hosts of honey-bees, and other species belonging to that family, among which the party-coloured and sonorous humble-bees are eminently conspicuous; and when in full foliage they become, from the abundance of insect food they afford, the favourite resort of several of our insectivorous warblers, such as the black-cap *(Curruca atricapilla)*, greater pettychaps *(Curruca hortensis)*, and those delicate species of the genus Sylvia, commonly known by

the name of Willow-wrens; at the same time may be seen the various species of our own native titmice, engaged in eager and prying search, and hanging from the tender spray in every possible attitude. The vignette represents the imago, pupa, and caterpillar of *Smerinthus populi*.



Salix caprea. LINN.

GOAT WILLOW, OR LARGE-LEAVED SALLOW.

Salix caprea,

LINN. sp. pl. 1448.
SMITH'S Eng. Bot. 1488. Id. Eng. Flor. iv. p. 225.
FORBES in Sal. Wob. No. cxxii.
HOOKER'S Br. Flor. p. 429. ed. III.
MACKAY'S Flor. Hibern part I. p. 252.
LOUDON'S Arb. Brit. ch. ciii. p. 1561.

THE present species, in some districts known by the name of the Saugh, is distinguished from all the other Willows by its large ovate, or sometimes orbicular ovate leaves, which are pointed, serrated, and waved on the

margin, beneath they are of a pale glaucous colour, and clothed with down, but dark green above. The stipules are crescent-shaped. The catkins are oval, very numerous, nearly sessile, and are expanded much earlier than the foliage. The ovary is stalked, silky, and ovate in form; the stigmas are undivided and nearly sessile.

The Goat Willow or Saugh, though barely reaching, even under favourable circumstances, the dimensions of a

tree of the second rank, is yet, we think, from the several valuable properties it possesses, of sufficient importance to be admitted within the limits of the present work. In favourable situations, and unmolested in its growth, it

attains a height of from thirty to forty feet, with a trunk from a foot to a foot and a half in diameter. It seldom, however, possesses any considerable length of clean stem, as the branches which form the head, generally begin to divide at a moderate height, and, diverging in different directions, give it the bearing and appearance of a compact, round-headed tree.

The foliage, unless seen directly from above, (when it appears entirely of a deep green,) has, from the mixture of the whitish under surface of the leaves with the deeper green of the upper, a dull glaucous appearance, which we have seen produce a good effect in certain situations and in contrast with the foliage of a different and livelier hue.

It grows in almost all soils and situations, but prefers dry loams, and in such attains its greatest size; and as the female plants are numerous and produce abundance of perfect seed, it propagates itself very extensively throughout the whole of Britain. Our associations as connected with this tree, are all of a pleasing description; it reminds

us, at an early period of the year, when its pure white silky catkins first burst the cerements that enshroud them, that the severity of winter is fast passing away and a milder season approaching. It is also a little later, when those catkins we lately admired for their silvery lustre are now glowing with a golden inflorescence, that we first hear and listen, with pleasurable feelings, beneath its richly-clothed head, to the busy hum of the honey-bee, and to that of its larger and more sonorous relative, the humble-bee, whose resuscitation from a long torpidity we have always been accustomed to hail as a certain indication of the commencement of spring and of a mild and genial temperature.

The wood of the Saugh is of a pinkish white colour, with a fine smooth grain; and, possessing considerable lateral as well as longitudinal adhesion, is tough and elastic. These properties render it applicable and well adapted to various purposes where small-sized wood only is required; thus, it makes good handles for hatchets and other tools, rake-teeth, &c. It also makes light and durable hurdles, which long resist the alternation of moisture and dryness. It is subject, however, to have the lower part of the stem much injured by the galleries or perforations of the larva of the *Trochilium crabroniforme*, (Lunar Hornet Sphinx,) a beautiful lepidopterous insect belonging to the family *Trochilidæ*. Few trees of this species,—to which it seems confined,—escape the ravages of this insect, and out of a great number of trees cut down at various times we scarcely recollect a single instance where the plant had attained a diameter of two or three inches, that had not been perforated by the *Trochilium*. In its perfect state it is rarely met with at large, and most of the specimens we possess have been

obtained from trees that had been cut down, and which were observed to contain the larva or the pupa of the insect. Such pieces as were found to contain these were kept in a large box placed in a dampish situation, and carefully watched till the developement of the perfect insect, which takes place towards the end of June or beginning of July. The following plan has also been adopted with success; this is to surround the lower part of the trunk of growing trees containing the pupa with fine muslin or leno, taking care so to secure the lower and upper ends, that the perfect insects when they come forth cannot escape between the muslin and the bark.

Trees infested with the larvæ are easily detected by the sawdust or abraded wood which is found at the bottom of the trunk, just where it emerges from the ground, and where the larva appears to make its first entrance, which some entomologists suppose is not till the second year of its own age, as the caterpillars and the perforations are all large and nearly of the same size, nor are any borings met with indicative of a small or newly-hatched worm; the supposition, therefore, is, that the caterpillar is hatched about the root of the tree, and for a certain period lives upon the tender bark of the roots, a fact, however, that we have not yet been able satisfactorily to ascertain.

Galleruca caprea, a beetle belonging to the family *Gallerucidæ*, also infests this as well as *Sal. cinerea*, both in its perfect and larva state; and the leaves are also often much injured by the caterpillars of *Nematus caprea*, a four-winged insect belonging to the *Tenthredinidæ*.

The bark of *Sal. caprea* contains a considerable proportion of tannin, and brings the same price as that of the birch and larch, in the north of England and Scotland.

It grows very rapidly for a few years, springing from the

seed, and trees when cut down, often throw up from the stock shoots of four or five feet in length the first year; the leaves of these shoots are very large, and the bark of a rich reddish brown. As an undergrowth it may be cultivated to profit, as its rapid growth quickly furnishes a supply of rods fit for corfs, crates, or basket-making.

Genus *Populus*, Tournf. Linn. *Syst. Diœcia Octandria.*

THE POPLAR.

The Poplars are mostly trees of very large size, growing with extraordinary rapidity, and equalling if not surpassing in that respect the large timber-sized willows already described. They are natives of Europe, parts of Asia, the west of Africa, and North America. Their wood is light, of a white or pale yellowish colour, very durable when kept dry, not liable to warp or twist when sawn up, and, from its elasticity, yields without splitting or cracking when struck with violence; that of some species is also very slow in taking fire, and when it is ignited burns in a smouldering manner, without flame, on which account it is valuable and extensively used for the flooring of manufactories and other buildings. The catkins of the male plants of most species are large and very ornamental, the anthers being of a rich purplish red colour; they are produced early in spring and before the bursting forth of the leaves. The seed produced by the females is enveloped in a fine cottony substance, which has sometimes been manufactured into paper and cloth.

The well-known tremulous motion of the leaves proceeds, in the *Pop. tremula* (Aspen), chiefly from the flattening of the footstalk, in other Poplars, from the great length and slenderness of this part in proportion to the weight of the attached leaves, so that they are acted upon and put

in motion by a very slight breath of air. The buds of many species, particularly those of *Pop. balsamifera* and *Pop. Canadensis*, are protected and varnished with a strong but agreeably-scented gummy matter, much sought after by honey-bees, who convert it into the substance called propolis, with which they stop chinks and cement their hives to the boards upon which they stand.

The species delight in a rich, moist soil, or in the neighbourhood of running water, but they do not thrive in marshes or soils saturated with stagnant moisture. Hitherto the male plants only of many exotic kinds have been introduced, so that no opportunity has existed of raising plants from seed; their propagation, therefore, is continued by means of cuttings and layers, and in some species by the suckers thrown up from the superficial roots. Considerable confusion appears to exist in regard to the species and varieties, and these difficulties are not likely to be solved till both sexes of the different kinds have been cultivated together, and their produce tested by experiment; on this account, we shall treat the various kinds to be described, as species, although Loudon deems some of them mere varieties, and even thinks that all the kinds now cultivated in Britain may be referred to and included under the generic heads of *Pop. alba*, *Pop. tremula*, *Pop. nigra*, and *Pop. balsamifera*.

The Poplars afford nourishment, both by their leaves and wood, to a great variety of insects in the larva as well as in the perfect state, but as notice will be taken of those most interesting for their beauty or rarity, when describing the different species, we omit any detailed enumeration of them at present.

Populus canescens. SMITH.

THE GREY, OR COMMON WHITE POPLAR.

Populus canescens, SMITH's Flor Brit. p. 1080. Id. Eng. Flor. vol. iv. p. 243.
MICHAUX's N. Amer. Syl. vol. ii. p. 245.
LOUDON's Arb. Brit. ch. ciii. p. 1639.

THE Grey Poplar by many botanists is considered a distinct species; by others it is accounted one of the varieties or forms of the White or Abele Poplar. Which

of these suppositions is the correct one, is not for us to determine, and, indeed, the attempt to do so, with our limited botanical knowledge, would be presumptuous. We therefore only venture to suggest that, if they are only varieties of one species, the original stock is more likely to be the *Pop. canescens* than the *Pop. alba*, the first appearing to have a wider geographical distribution, and to be more generally met with in a wild and indigenous state, than the latter.

It is distinguished from the *Pop. alba* by its leaves, which are less deeply and acutely lobed, and, instead of being covered with the thick, snow-white down which clothes the under surface of the leaves of the Abele, the downy substance is sparing and of a grey colour, and, indeed, in some instances, the leaves are almost glabrous. The catkins of the female *Pop. canescens* also are cylindrical instead of oval, and the stigmas eight instead of four. Other characters also are not wanting, such as the growth of the branches, which are more upright and compact in *Pop. canescens*, whose bark is also different in colour from that of *Pop. alba*.

The Grey Poplar attains in favourable situations, such as a loose moist soil on the banks of a river, pond, or like locality, a very large size, frequently running up to the height of eighty or ninety feet, with a diameter of trunk from three to five, and even seven feet.*

* See statistics of this tree in the "Arboretum Britannicum."

When arrived at maturity it presents the appearance of a tree with a wide and spreading head, rather thinly clothed with foliage, and a straight trunk, often clear of branches to the height of thirty or forty feet. It grows with great rapidity, and, as a timber tree, is at its highest state of perfection at the age of fifty or sixty years; for though its existence may be prolonged considerably beyond a century, a decay at the heart or central part of the trunk, usually commences at the age above mentioned.

The Grey Poplar is supposed to be indigenous to Britain, being met with in a wild state at very remote and distant stations; its near relative, the Abele, with which it is frequently confounded, is, on the contrary, said to have been introduced from Flanders, and this seems to be supported by Evelyn's statement of the propagation of the Grey Poplar, where he says, "There is a finer sort of White Poplar, which the Dutch call abeel, and we have of late much of it transported out of Holland."

As an ornamental tree, it is not unworthy of a place in extensive parks and grounds, particularly when planted in low situations, or near to water; it ought, however, to be grouped and massed with trees of equally rapid growth, else it soon becomes disproportionate, and out of keeping with those whose progress is comparatively slow. In

France, and other parts of the Continent, it is extensively used as a wayside tree, for which, Loudon remarks, it is well adapted in a climate like our own, for, growing with a clean trunk, it has no side branches to prevent the admission of light and free circulation of air, both very necessary to the keeping of our highways in a state of good repair. It is also sometimes used to form avenues of approach, and when an effect is wished to be produced in the shortest possible time, answers the purpose perhaps better than any other rapid-growing tree, as its form is often fine, and it carries an ample head. As an avenue tree, however, it is inferior to the elm, beech, lime, and some others, and is, besides, objectionable on account of the numerous suckers it throws up, to a great distance around, and it is, therefore, only in cases where time is considered of great importance, that we recommend it for this purpose.

Hitherto this Poplar, though widely distributed throughout Britain, and long propagated in our nurseries, has never been extensively planted, and rarely in masses together; we are however, of opinion, from its rapid growth, the size it attains, and its clean straight timber, that it would prove a very profitable tree to the planter, in localities where wood of its quality is in demand, such as in manufacturing districts where Poplar and willow wood is used for flooring, machinery, &c.—Plantations composed of it would also have the advantage of furnishing, for an indefinite length of time, a constant succession of timber, as young trees from the suckers would always be in training to replace those annually cut down. It is also well adapted to fill up blanks in young plantations, and we recommend its insertion in narrow belts and strips, where, if not allowed to grow to maturity, it might be kept as

an undergrowth to protect and shelter other trees, and contribute to take away the naked and starved appearance such plantations so generally exhibit.

In cultivating this Poplar in masses, and with a view to produce timber, Loudon recommends the young trees to be planted from fifteen to eighteen feet apart every way: this we consider quite necessary, both on account of its rapid growth and the running nature of its roots, which require space to throw up strong suckers to succeed the first planted trees as they are thinned out; should the soil not be of too moist a nature, the interstices might, when the plantation is first made, be filled with larches, which would yield a crop of useful railing, posts, &c., before the Poplars had reached a timber size.

No tree requires less pruning, even the shortening in of branches is rarely wanted, and large limbs ought never to be amputated, as the wounds readily imbibe the wet, and soon communicate a taint and rot to the trunk of the tree.

The soil most congenial to the nature of the Grey Poplar is a loam near water, but not where the earth is saturated with stagnant moisture. The wood of trees, however, grown in rich moist ground, is more open and spongy in texture than when cultivated upon drier soils, where the species, though it does not make the same rapid advance, thrives very well and attains a large and useful size.

It is propagated by layers, or by suckers thrown up by the roots which run near the surface, and sometimes by cuttings or truncheons, which may be planted any time during the spring months.

The wood is very white, and when dry of a tough nature, allowing nails to be driven into it without splitting,

on which account, and its lightness, it is well adapted for packing-cases; it also affords excellent and durable deals for flooring boards, barn-doors, &c., and by the musical instrument-maker is often substituted for the wood of the lime-tree. In Scotland it is used in mill-work, as well as by the turner and cooper, and for its lightness and smoothness the boards and rollers around which silks and other articles are wrapped, are also made of Poplar wood. In a fresh state it weighs about fifty-eight pounds, the cubic foot, and loses about nineteen in the process of seasoning, as when well dried it is reduced to about thirty-nine pounds.

The leaves of the Grey Poplar are frequently eaten by the caterpillar of *Smerinthus Populi*, and we generally find that of *Clostera reclusa* upon it, as well as others belonging to the *Notodontidæ*.

Towards autumn the foliage is often disfigured by the growth of parasitic plants which abound upon most species of this genus, and *Polyporus ignarius* and other large fungi are frequently seen upon the stools and decaying trunks of this tree.

At Twizell, about eighteen years planted, the Grey Poplar is nearly fifty feet high, the circumference of the trunk, at two feet from the ground, three feet. At Fallowden, the seat of General Sir H. Grey, there is a picturesque tree, nine feet seven inches in girth.

Populus alba. Linn.

WHITE POPLAR, OR ABELE TREE.

Populus alba, Linn. sp. pl. 1463.
Smith's Eng. Bot. 623. t. xvi. Id. Eng. Flor. iv. p. 243.
Hooker's Br. Flor. p. 432. ed. ii.
Mackay's Flor. Hibern. part. i. p. 254.

Provincial. Dutch Beech, Great White Poplar.

Nearly as this tree is allied to the foregoing species, we deem it most prudent under the circumstances of uncertainty in which the genus is involved, to follow the

opinion of Sir J. E. Smith, and other botanists, and to treat it as distinct.

In the specific characters assigned to the *Pop. canescens*, the stigmas are stated to be eight; in the *Pop. alba* they are only four in number; the catkins of the female of *Pop. alba*, instead of being cylindrical, are ovate. The leaves are lobed and toothed, in young plants almost palmate, and covered with a thick snow-white down beneath, the upper surface being dark green and smooth. The branches are white, and when young thickly covered with down, and in their growth more horizontal and spreading than in *Pop. canescens*. It grows rapidly, and frequently to as great a size as the Grey Poplar, flourishing best in a rich moist soil, though we have seen it of large dimensions in dryish situations.

It is a native of Europe, and widely dispersed upon the Continent, though perhaps not indigenous to Britain, but first introduced from Flanders or Holland, where it abounds and is extensively cultivated.

The wood of this species is not of so good a quality as that of the Grey Poplar, being softer and more spongy in texture: it may, however, be applied to many similar purposes, but upon the whole, both as an ornamental and profitable tree, we consider it decidedly inferior to the other. In certain situations the contrast produced by the snowy whiteness of its leaves when agitated by the wind, with foliage of a darker hue, has a peculiar and sparkling effect, and it is, therefore, a tree that may occasionally be successfully introduced in landscape gardening. Some of its varieties, also, such as *Pop. acerifolia*, and *Pop. tomentosa*, the Maple-leaved and Hoary Poplar of the nurseries, distinguished by larger and more palmate-shaped leaves, and with even a greater degree of snowy

whiteness, are worth cultivating for their appearance. The *Pop. Egyptiaca*, which Loudon supposes a variety of *Pop. alba*, appears, from the plants we possess, to be very different in character, and more likely to belong to *Pop. nigra*, or else to the group to which the Lombardy Poplar *(Pop. fastigiata)*, belongs.

Populus tremula. LINN.

THE ASPEN, OR TREMBLING POPLAR.

Pop. tremula
LINN. sp. pl. 1464.
SMITH'S Eng. Bot. p. 1909. Id. Eng. Flor. vol. iv. p. 244.
HOOKER'S Flor. Scot. p. 289.
MACKAY'S Flor. Hibern. part I. p. 254.
JOHNSTON'S Flor. of Ber. 1. p. 219.
LOUDON'S Arb. Brit. vol. i. ch. ciii. p. 1645.

THE following are the chief specific or distinguishing characters of this tree according to Smith and Hooker. Leaves nearly orbicular, broadly toothed, glabrous on

both sides, petioles compressed, young branches hairy, stigmas four, erect and auricled at the base.

For elegance and beauty of form, the Aspen, when grown in a favourable soil and where nothing has interfered with its developement, is inferior to few of its tribe, presenting the appearance of a tall and, in proportion to its height, rather a slender tree, with a clean straight stem, the head ample and formed of horizontal growing branches, not crowded together, and which, as the tree acquires age, assume, towards the extremities, a drooping or pendulous direction. The foliage is of a fine rich green, and the upper surface of the leaves being somewhat darker than the under, a sparkling and peculiar effect is produced by the almost constant tremulous motion with which they are affected by the slightest breath of air, and which is produced by the peculiar form of the foot-stalks, which in this species is flattened, or vertically compressed in relation to the plane of the leaf, causing a quivering or double lateral motion, instead of the usual waving motion, where the footstalk is round, or else compressed horizontally.

On the margins of woods in a rich moist soil, and where it has had sufficient room and air to acquire its full developement, we have often admired the effect produced by the Aspen in combination or in contrast with the

foliage of other trees; it is also frequently an interesting object on the wooded slopes of highland scenery, and in Scotland adorns the margins and hanging woods of its most interesting and beautiful lochs. Upon Loch Katrine it mingles with the birch, and clothes, almost to the exclusion of other trees, the classic islet of the Lady of the Lake.

It is indigenous to Britain, being found throughout England in moist woods and damp situations, and in Scotland it extends as far north as the borders of Sutherland. In Aberdeenshire, near Braemar in the woods of Invercauld, it grows at an elevation of sixteen hundred feet, and we have seen it as high in different parts of Argyleshire. In Ireland, according to Mackay, it is found native in the County of Dublin, and several other districts. Upon the European continent its distribution extends over the southern as well as the northern parts, nearly to the verge of the Frozen Ocean; in Russia, Loudon states it to be very abundant, particularly in the woods around Moscow, and he mentions the interesting fact that in the year 1813, the year following the burning of that ancient city, innumerable seedling plants of the Aspen sprang up in every direction among the ruins, no doubt from seed that had been wafted thither by the wind from the neighbouring woods. It is also a native of Asia Minor, and the whole of the Caucasian range. If it were not for the innumerable suckers thrown up to a great distance by this tree, its ornamental properties would claim a more extensive cultivation in landscape scenery than it has hitherto received, but this disadvantage is of so serious a nature in pleasure-grounds, lawns, and meadows, that it must always be sparingly introduced in such situations; the objection, however, does not extend to large woods, or

wooded slopes in upland districts, where it might be planted to advantage in the moister parts, as it grows rapidly and soon attains a profitable size.

The wood is white, light, and rather tender, but well adapted for the staves of herring-casks, milk-pails, &c. It is also employed by turners, and, cutting clean and sweetly with the chisel, is adapted for carving in wood; it is also applicable to various purposes in house carpentry, provided it be kept dry, but in this respect is much inferior to the wood of the Grey and the Black Italian Poplars. The bark contains a considerable percentage of tannin, and is used, with that of other species, by the tanner, and it was the favourite food of the beaver when that animal abounded in the north of Europe. It is sometimes used as a vermifuge for horses, and in some countries is a domestic medicine for scorbutic and other cases.

Unlike many of its congeners, the wood of the Aspen burns with a clear flame, but gives out very little heat; its value as a fuel, compared with the beech, being, according to Loudon, as 970 to 1540.

The spray and leaves are greedily eaten by deer, goats, sheep, and other herbivorous quadrupeds, and in countries where hay and fodder are scarce, the young shoots and leaves are cut and dried for winter food.

The soil in which it grows most luxuriantly is a moist loam, but as the roots run near the surface it does not require it to be deep. In such situations, planted in mass at six or eight feet distance, it will, in the course of twelve or fourteen years, make a profitable return, as at that age it will be of sufficient size to saw up into herring-barrel staves, for which at present there is so great a demand. It attains perfection in fifty or sixty years, after which it begins to decay at the heart. At this age it has fre-

quently reached a height of seventy or eighty feet, with a diameter of three or four feet.* In dry soils the Aspen never reaches a great size, though it lives many years, and the wood is of good quality.

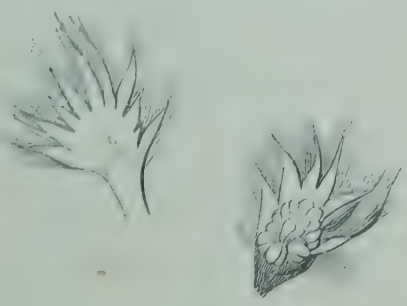
It is easily propagated by the suckers, which are thrown up in great abundance, as well as by the cuttings of the roots, which succeed better than those taken from the branches of the tree. Young seedlings are also abundant in all woods where it grows, and these are perhaps preferable to plants raised by the other methods we have named.

The leaves are eaten by the caterpillars of many nocturnal Lepidoptera, as by that of *Cerura vinula*, *Notodonta ziczac*, &c., and by many of the Chrysomelidæ, among which *Phaëdon vitulina*, is sometimes very numerous.

The red warty-looking excrescences upon the leaves and leaf-stalks are produced by wounds inflicted by the ovipositor of a tipula which selects these parts as depositories for its eggs.

In some countries curious superstitions existed, and indeed still exist, respecting the Aspen, originating from the constant tremulous motion of the leaves; thus, by the Highlanders it is supposed to be the wood of

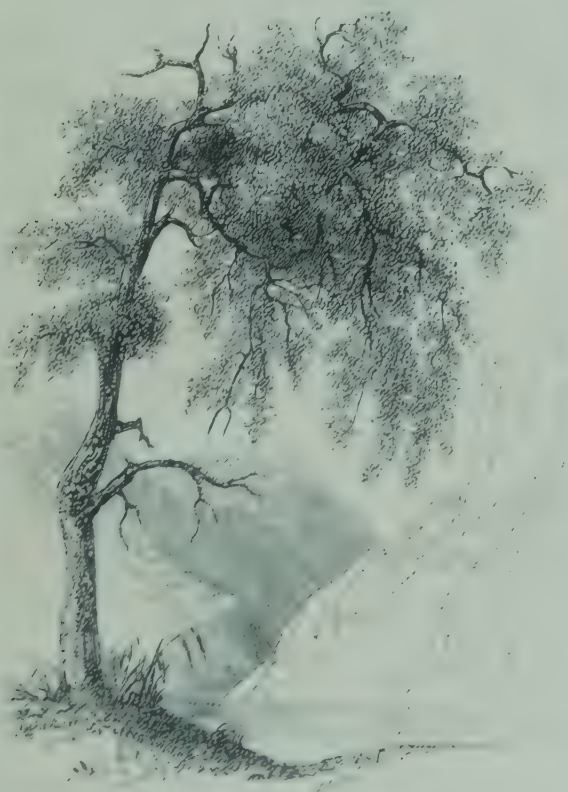
* See the statistics of the Aspen in Loudon's "Arboretum Britannicum."



which the holy cross of Christ was made, and on this account they believe its leaves can never more remain at rest. Its peculiar quivering motion has also frequently arrested the attention of the poet, and many allusions to it are made by modern writers, among which none is more beautiful than the well-known lines in Marmion:—

> "Oh! woman, in our hours of ease,
> Uncertain, coy, and hard to please,
> And variable as the shade
> By the light quivering Aspen made;
> When pain and anguish wring the brow,
> A ministering angel thou!"

The vignette represents one of the Aspens growing upon the Lady's Islet, in Loch Katrine. Our figure from a tree growing at Twizell.



As a species nearly allied to the Aspen, but as an ornamental tree superior to it in many respects, we deem the *Populus Græca* of Aiton, and other writers, worthy of a few remarks.

The specific term of *Græca*, and classic appellation of *Athenian Poplar*, naturally lead to the supposition that this species is indigenous to Greece, and that it derives its name from the city of Minerva; such an opinion we entertained in common we believe with many others, and even botanical writers gave weight and currency to

the supposition, as Willdenow records it in his "Species Plantarum" as a native of the islands of the Archipelago. It appears, however, from the account contained in the "Nov. du Hamel," and from other evidence, that the North American Continent is its real native country, and that growing abundantly in a particular township called Athens, it received from it the imposing and euphonious title of Athenian Poplar. This origin Loudon thinks the more probable from the circumstance of its having been first introduced by Hugh, Duke of Northumberland, who served in America during the colonial war, and imported from thence a great variety of American trees, many of which now adorn the grounds at Sion House, and Alnwick Castle, at which latter place the original tree from whence our own plants and those disseminated in the north of England are derived, was first planted. It is a tree of handsome appearance, with a stem rather slender in proportion to its height. The bark, until the

trees become of a considerable size and age, is very smooth, and of a pale greenish grey colour, and the leaves which are roundish-ovate in shape and terminate in a sharp point, are of a pleasant, deep, and rather glaucous green; they expand early in spring, immediately succeeding those of the Balsam Poplar, and have the advantage of being retained till a late period in autumn. The catkins are shorter than those of the Aspen, and come out at a much earlier period.

It grows rapidly, young trees often making shoots in one season of five or six feet in length, and, though a slender-stemmed tree, has the valuable property of resisting the wind, and is never seen, even in the most exposed situations, but with an erect and perpendicular trunk.

The same objection, however, attends the cultivation of this species, as that of the Aspen, viz., the throwing up of numerous suckers from the surface roots, and on this account its cultivation as an ornamental tree must always be limited, and of the propriety of planting it in mass with a view to profit, in outlying situations, we cannot venture an opinion, having had but little experience of the properties and qualities of the wood.

It is readily propagated by the suckers it throws up, and by layers, being one of the few belonging to the genus that does not not succeed by cuttings. The leaves are a favourite food of the caterpillar of the Poplar Hawk

Sphinx, *Smerinthus populi*, and we have also found upon it those of *Cerura vinula*, *Notodonta ziczac*, *Clostera reclusa*, *Leiocampa dictæa*, and *Calyptra libatrix*.

The specific characters, according to Willdenow, are, branches round and smooth, leaf-stalks compressed, the disk of the leaves roundish-ovate, the end acutely pointed, and with a shallow sinus at the base, serrated, with equal adpressed teeth, smooth, except being slightly ciliated on the edge.

At Twizell, twenty years planted, it is thirty-five feet high, and two feet six inches in circumference at two feet from the ground. Our figure is a portrait of this tree. At Howick Hall, the seat of the Earl Grey, there are specimens of larger dimensions.

Populus nigra. LINN.

BLACK POPLAR.

Populus nigra,

LINN. sp. pl. 1464.
SMITH'S Eng. Bot. t. 1910. Id. Eng. Flor. iv. p. 245.
HOOKER'S Flor. Scot. p. 289.
MACKAY'S Flor. Hibern. part I. p. 251.
LOUDON'S Arb. Brit. part III. p. 1652.

THE specific or botanical characters of this species, according to Smith and Hooker, are, leaves deltoid, pointed, serrated, smooth on both sides, catkins lax, cylindrical, stigmas four, simple and spreading.

The wide distribution of this species throughout Britain, and the localities in which we have seen it growing apparently in a wild and natural state, are strongly in favour of its being indigenous, although Sir W. J. Hooker, in the "Flora Scotica," mentions it as of doubtful origin; nothing however is said by the old English authors to lead to such a conclusion, and we find that its geographical distribution is nearly co-extensive with that of *Pop. alba*, and *Pop. canescens*. It is a tree of rapid and vigorous growth, and attains the size of one of the first magnitude, and as it generally possesses a fine stem and an ample head, it is often highly ornamental when planted in an appropriate situation, and in combination with other quick-growing trees. Formerly it was freely introduced into plantations, but within the last twenty years some of the American species have taken its place, particularly the *Pop. monilifera*, or Black Italian Poplar, one of the most valuable and usually the largest of the genus. The Ontario Poplar, *Pop. candicans*, a species nearly allied to, if not a variety of, the *Pop. balsamifera*, Balsam Poplar, or Tacamahac, has also lately come into fashion, but as it is only a tree of the second rank, it is not likely to be cultivated for profit, but merely for the effect of its tufted and dark green foliage, and the pleasant balsamic odour diffused by the buds and newly expanded leaves in early spring.

In a rich moist surface soil, particularly in the vicinity of running water, the growth of the Black Poplar is very rapid, being at the rate of three or four feet every year; it attains perfection in forty or fifty years, at which age it ought to be cut down if meant for use, as it begins to decay soon after this period.

The wood is of a pale yellowish white colour, soft, and easily worked, and is much used by turners for bowls,

and other wooden ware, and indeed is applicable to most purposes for which the timber of the Poplars is adapted. Upon the Continent, and especially in Flanders, it is extensively planted as a hedge-row tree together with the White Poplar, and cut down at the age of twenty-four or twenty-five years, to make sabots or wooden shoes, for which its lightness and tenacity of fibre adapt it.

In dampish situations, planted in mass, or mixed with the Grey Poplar, where poles, small rafters, and railing, are in demand, it would make a quick return, as a growth of eight or ten years would render it fit for these purposes.

When cut over young, it throws up numerous shoots, which may be used like willows for basket-making; it also bears lopping much better than the species already described, and as a pollard produces an abundant supply of stakes and poles, but is almost useless as fuel, in which respect, compared with the beech, it is stated to be as 792 to 1540.

The bark is used by the tanner, and in Russia it enters into the manufacture of Morocco leather, and as it becomes very thick and corky upon old trees, it affords a material to support and float the nets of the fisherman.

The foliage of the Black Poplar is of a pleasant pale green, smooth and shining, and producing sparkling and ever-varying lights, as it flutters with the gentlest zephyr, in the beams of the sun; it is, however, late in expanding, as it is seldom in full leaf before the end of May or beginning of June, a disadvantage that also attends the cultivation of the Black Italian Poplar.

The catkins of the male appear in March or April, long before the expansion of the leaves, and, being large and of a deep red colour, produce a rich effect at that early period of the year.

The capsules or seed vessels of the female are round, and contain a pure white cottony down, in which the seeds are enveloped; attempts to turn this substance to profit in the manufacture of hats, cloth, and paper, have been made, but owing to the shortness and want of elasticity of its fibre, without much success.

As in several other species, the buds are protected by a gummy varnish, having an agreeable smell, and which formed the *unguentum populeon*, or profitable ointment of Gerard; Loudon also mentions that after being macerated in boiling water, bruised in a mortar, and pressed, they yield a fatty substance, which burns like wax, and emits a fine odour.

Several of the caterpillars we have already mentioned as feeding upon the leaves of other poplars, are also found upon this tree; it also produces protuberances of varied form and shape upon the petioles of the leaves and young shoots, which are the nidi of the *Aphis populi*. Among the statistics of existing trees mentioned in the "Arboretum Britannicum," are several from seventy to eighty feet high, and one upwards of ninety, with a trunk of more than five feet in diameter. It is readily propagated by cuttings or truncheons, which may either be inserted at once, where they are intended to remain, or rooted for a season in the nursery.

Populus monilifera. Ait.

BLACK ITALIAN, or NECKLACE-BEARING POPLAR.

Populus monilifera,

Ait. Hort. Kew. ed. 1, iii. p. 406.
Pursh's Flor. Amer. Sept. 2. p. 618.
Watson's Dend. Brit. t. 102.
Loudon's Arb. Brit. p. iii. ch. iii. p. 1657.

The specific characters of *Pop. monilifera*, which seems nearly related to the Canadian Poplar (*Pop. Canadensis*),

and of which kind Loudon conjectures it may possibly be an improved variety, are as follow:—annual shoots more or less angular, the branches becoming round after the first year; leaves deltoid, glabrous, except the edge, which when young is ciliated, generally subcordate at the base, serrated, the serratures with incurved points, tip pointed and acute, petioles compressed at the upper part, slender, generally as long as the disk of the leaves. Catkins of the male five or six inches long, the flowers upon pedicles, stamens sixteen. Female with about forty flowers in a catkin, stigmas four, dilated and jagged.

Although bearing the name of Black Italian Poplar, it is still a matter of uncertainty to what country it really belongs, as no direct proof of its having been found in a wild and natural state, either in Europe, upon the American continent, or elsewhere, has yet been produced. There seems no doubt, however, of its having been first introduced into Britain from North America, first in 1772 by Dr. John Hope, who brought it from Canada, and again by a Scotch gentleman, a few years afterwards, from whom it was obtained by the Messrs. Dickson, Nurserymen at Hazendean, who first brought it prominently into notice and extensive cultivation, and to whom it is also indebted for its present name; Mr. Archibald Dickson having understood that it was a species common to

Italy as well as to North America. We may, however, remark that, although imported to England from America, it has never been found growing in a wild state in the latter country, neither of the Michauxs, father or son, having met with it, and Pursh it appears has only seen it growing in gardens, and never in a natural state. We are not aware how long it has been known or cultivated in Europe, but probably for a considerable period, as it has been planted to a great extent in parts of Switzerland, and is well known to the French by the name of *Peuplier Suisse*, so that there does appear to be some foundation for another conjecture of Loudon's, viz. that it may have originated in Switzerland or Italy, and been afterwards carried from thence to North America. If it be only a variety of some other species, a circumstance by no means improbable, it may, if of European origin, either have sprung from the seeds of the Black Poplar, *Pop. nigra*, or from those of the Lombardy Poplar, *Pop. fastigiata*, (which Loudon again supposes may itself be a variety of *Pop. nigra*,) as it appears to partake in an intermediate degree of the character of both kinds, being more fastigiate in its growth than the one and less so than the other; or if it originated in America, from the *Pop. Canadensis*, to which it is generally allowed to appear nearly related. Of all the Poplars hitherto introduced, it is, we think, by far the most valuable, looking to it in the light of a useful and profitable timber tree, as it grows with astonishing rapidity, and produces a timber of large scantling and excellent quality, equal if not superior to that of any other of its genus. During youth the side branches are subordinate to the main stem, which shoots up erect and perfectly straight to a height of eighty, ninety, and even one hundred and twenty feet. The ramification of young

ACC No 5981

trees, though not so fastigiate as that of the Lombardy Poplar, is more so than that of most other kinds; and it is not till it has reached the age of twenty-five or thirty years, and attained the dimensions of a first-rank tree, that its principal branches begin to swell and to take a more horizontal and spreading direction. To attain its greatest developement it requires a free moist loam, and it thrives particularly well near to running water; it also succeeds and grows to a very large tree upon stiffish loam, and even upon light and sandy soil makes good progress. As a hedge-row tree in exposed situations we have also found it to succeed beyond expectation, as it resists or stands well up to the wind, and, in growth far outstrips the ash, elm, and indeed any other tree, except perchance the *Salix alba* and *Salix Russelliana*. It requires both air and space to arrive at perfection, and does not succeed well in mixed plantations closely cooped up by other trees, or even when planted thickly by itself; therefore, when intended for full-sized timber and grown in mass, the plants ought to be put in at wide distances or from sixteen to eighteen feet apart. It may, however, be planted much thicker when intended for poles, small rafters, &c., as the trunk in a few years runs up to a very great height, without much taper or difference of diameter; and such plantations upon a good soil we have no doubt would yield a great and rapid profit, where wood of this description is in demand.

The wood is of a greyish white colour, tough when seasoned, and if kept dry very durable; its great size renders it fit for the largest buildings, and as flooring for manufactories and other erections nothing can surpass it, as in addition to the property of not splitting by percussion it possesses the peculiar advantage of not easily

taking fire, and even when ignited burning without flame or violence.

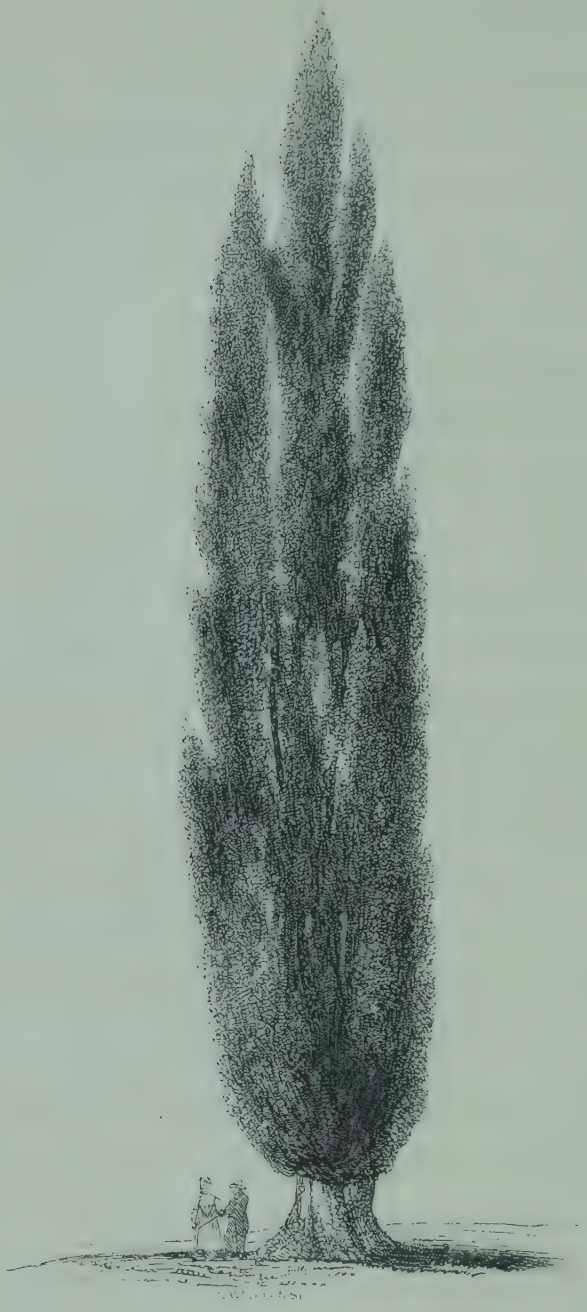
As an ornamental tree it well deserves a place in extensive grounds, its spiry height and pyramidal form before it becomes aged, being well calculated to break long horizontal lines, or the monotonous effect of round-headed trees; it also, in a great measure from its semifastigiate growth in the young state, supplies the place of the Lombardy Poplar in such scenery, either of wooded landscape or in combination with buildings, as is improved by the presence of that tree. The principal objection to its frequent introduction in ornamental scenery is the late period of its coming into leaf, and the comparatively early one at which the foliage is shed; in the north of England it is seldom in full leaf before the middle of June, and is again denuded by the end of October.

The caterpillars of *Cerura vinula* and *Cer. furcula*, as well as that of *Smerinthus populi*, feed upon this Poplar. We have also found those of several of the notodontidæ, that of *Calyptra libatrix*, and also the larva of a large tenthredinous fly; the stem of young trees is also subject to the attack of *Cryptorynchus lapathi*, and in some seasons we have had several plants completely drilled by the larvæ of this weevil.

In addition to the trees particularized in the "Arboretum Britannicum," one of the largest and finest, and perhaps, also, one of the oldest specimens of the species in Britain, is now growing at Maxwell heugh, near Kelso. The trunk, previous to dividing into the enormous limbs which form the head, is sixteen feet and a half in height; at the base it measures thirty-one feet in girth, at two feet above the ground twenty-one feet, and at ten feet above the base eighteen feet; its solid contents are found to be upwards

of nine hundred feet, and yet this enormous vegetable production cannot be much above sixty years old. At Twizell, planted in light free loam about twenty-two years ago, it is upwards of sixty feet high, with a straight continuous trunk, and measures in girth, at two feet from the ground, five feet five inches: others of a younger age show an equal rapidity of growth.

It is easily propagated by cuttings made of the young wood, which ought to be planted during winter or early spring. We commonly keep them in the nursery for a year or two, by which time they become well rooted and attain a height of five or six feet, and never fail to succeed when transferred to their permanent stations.



Populus fastigiata. Desf.

LOMBARDY POPLAR.

Populus fastigiata,	Desf. Hist. Arb. ii. p. 469.
	Loudon's Arb. Brit. part iii. ch. ciii. p. 1610.
Pop. dilatata,	Ait. Hort. Kew. ed. iii. p. 406.
	Willd. sp. pl. iv. p. 804.

In its close fastigiate growth and cypress-like form, which seems to be retained during the whole of its existence, the Lombardy Poplar is too conspicuous not to be immedi-

ately recognized and readily distinguished from all other species of the genus; the trunk also is much more deeply furrowed than that of any other Poplar, and the grooves often assume a spiral or twisting direction, and give the entire stem the appearance of being made up of several plants that had united and become connected together. It grows in favourable situations and in good soil with great rapidity, often attaining a height of sixty or eighty feet in less than thirty years, and one instance is mentioned in the "Arboretum Britannicum," of a tree, still we believe growing at Great Tew in Oxfordshire, that at fifty years old had reached the spire-like height of one hundred and twenty-five feet.

As might be expected in a tree of so rapid a growth, its duration is very brief compared with the longevity of slower-growing trees, and most of the plants first introduced into the kingdom, which took place about eighty years ago, are now either dead or in a state of decay; such is the case with those at Blenheim mentioned by Gilpin, which were planted about the year 1760, or soon after Lord Rochford had imported the first cuttings of this Poplar from Turin.

By some dendrologists the Lombardy Poplar is considered indigenous to that province or district of Italy, and the fact of young plants of this kind as well as of *Pop. nigra* springing up on the banks of the Po, where the surface soil has in part been washed off by the over-

flowing of that river, is adduced by Signor Manetti in favour of such an opinion, basing it on the presumed fact that the seeds had there lain buried for many years; but, as Loudon justly observes, it is as probable that the plants in question may have sprung from fresh seeds disseminated by the winds the same season, and which would naturally vegetate freely and rapidly upon soil thus prepared for their reception; the circumstance also, of a tree so peculiar in its aspect remaining unnoticed by ancient Latin authors, and among the rest by Pliny, who would scarcely have overlooked it had it been known in his day, as well as the additional and singular fact that the Lombardy Poplar was not introduced into Tuscany till 1805, are all against the supposition of its Italian origin, and strongly in favour of that of Bosc and other botanists, who suppose it to have been introduced into Italy from Persia, where it abounds, and of which country, as well as the Himmalayas, it is believed to be a native.

As a useful and profitable timber-tree, the Lombardy Poplar is greatly inferior to some of the species already described, the twisted and deeply-furrowed trunk, even of the tallest and largest trees, cutting to much waste, and affording boards of only a moderate size when sawn up. The wood is also softer and more spongy than that of the Black, and the Black Italian Poplars, and rapidly decays unless kept perfectly dry.

In Italy, most of the vessels in which grapes were carried home from the vineyards, were formerly made of the wood of the Lombardy Poplar, its lightness rendering them, even when of very large size, easily manageable; of late years, however, its culture has given way to that of the *Pop. nigra*, a tree found to be more generally useful, and whose wood is equally light, and therefore as well

adapted for the purpose above-mentioned. In France, fences are frequently formed of this tree; plants, when about six feet high, being run in lines six inches apart, they are then connected by a horizontal rod about three feet above the ground, and thus treated, produce a fence the first season. In five or six years, the trees composing the fence are either all cut down for various minor purposes, or else they are thinned out, and a certain number left to attain a timber-like size, which they do in eighteen or twenty years; but this mode, Loudon observes, is only followed when the fields enclosed are of such a size as not to be injured by the shade of the trees.

As a tree requiring a free circulation of air and room, it does not thrive in close mixed plantations, or even in masses by itself, on which account it is unfit to be planted even as an undergrowth to furnish poles or inferior sized wood for minor purposes. In Britain, therefore, it is cultivated almost exclusively as an ornamental tree, for which its towering height and spire-like form eminently qualify it, particularly when associated with buildings, and so used either as a counterpoise or supporting mass to these, or to break the uniformity of long horizontal lines. Its use, however, in landscape composition, requires skill and judgment, and a thorough knowledge of the effect to be produced, for placed inadvertently, or without attention to surrounding objects, it more frequently mars than improves the scene, a fact that must frequently have been observed where this tree has been largely and unskilfully introduced.*

From its harmonising so well with buildings, the small

* In the "Arboretum Britannicum" our readers will find some appropriate remarks on the effects produced in landscape by this tree, illustrated by excellent woodcuts.

space it occupies from its close fastigiate growth, and its patient endurance of smoke, it is a tree peculiarly adapted to ornament cities, towns, and villages, and we should therefore like to see it more freely planted than it has hitherto been, at least in the North of England and Scotland. Around our country residences its use should be much more restricted than in urban scenes, though its introduction is often attended with the happiest effect, and indeed almost necessary to break the monotony of horizontal lines formed by ornamental plantations of round-headed trees; but, as we have previously hinted, judgment and taste must be consulted in their disposition, so as to produce the best and wished-for effect. At the period Gilpin wrote his "Forest Scenery," the Lombardy Poplar had not been long introduced; he speaks, however, in favourable terms, of the young trees growing in the park at Blenheim, then scarce twenty years old, and notices a beauty almost peculiar to itself, viz. the waving line it forms when agitated by the wind, and which he aptly compares to that of an ostrich feather on a lady's head, moving in one simple sweep from the top to the bottom, or, as Leigh Hunt poetically describes it,—

——————— "The poplar's shoot,
Which, like a feather, waves from head to foot;"

and not partially agitated, as is the case with most other trees.

It is sometimes planted so as to form a hedge in nurseries, and being cut even at a certain height, and regularly trimmed, becomes a thick and verdant fence; Loudon also recommends it as an excellent tree for sheltering fields or gardens in a flat country, in this case certainly more useful than picturesque.

It is propagated by cuttings of the young wood which

root freely, and are fit to be moved to permanent stations after one or two years' growth, but to ensure a large and rapid-growing tree it must be planted in soil of more than ordinary quality. The specific characters are,—disk of leaf deltoid, wider than long, the whole of the edge from the base crenulated, glabrous on both surfaces, petiole compressed. The leaves are the food of various lepidopterous caterpillars, among which are those of *Smerinthus populi*, *Cerura vinula*, and *furcula*, and some of the Notodontidæ.

Populus balsamifera. Linn.

BALSAM POPLAR, or TACAMAHAC.

Populus balsamifera,

Linn. syst. 45.
Aiton's Hort. Kew. ed. ii. p. 397.
Michaux, Arb. N. Amer. ii. p. 237.
Loudon's Arb. Brit. part iii. ch. ciii. p. 1673.

The early period at which it bursts into leaf, cheering the eye with the first green tint of spring, and the fine balsamic odour emitted by the buds and tender leaves,

are the chief recommendations of the Tacamahac, for unless planted in a sheltered situation and a rich soil it seldom attains to more than the dimensions of a tree of the second rank, and that without assuming any beauty or peculiarity of form to render it a conspicuous object in ornamental planting. It is a native of North America, reaching to high latitudes, and was found by Sir John Franklin to form the greater part of the drift timber on the shores of the Arctic Sea. It is also indigenous to Northern Asia, being common in Siberia, the Altaic range, and Dahuria. In these districts, according to Pal-

las, it is seldom seen of large size, but generally as a low round-headed tree. In Canada, according to Michaux, it sometimes reaches a height of eighty feet with a trunk of three feet in diameter.

The wood is of little value, being soft and spongy, and is only fit for packing-boxes, or where a light material is required. It appears to have been one of the earliest trees introduced into England from the American continent, having been cultivated, according to Aiton, in Hampton Court garden in 1692. Into Scotland its introduction was at a much later period, as we are told by Dr. Walker that the first plants were reared in 1768 in a nursery-ground at Leith, from seeds sent from Canada. For a few years it grows very rapidly, and the leaves are large and handsome, but as it acquires age they diminish in size, and the tree generally acquires a scrubby appearance. The shoots are round, and the buds, which are full and large, are protected by a gummy and highly-scented matter, which used to be sent from Canada under the name of *Baume focot*, and was collected from the trees in spring, when the increasing temperature of the season partly melts the resinous varnish, and it collects in drops on the points of the buds.

The leaves are of an ovate-lanceolate shape, the edges serrated, with adpressed teeth, and of a pale

yellowish green when first expanded, but when matured of a deep green on the upper surface and whitish green beneath, with glabrous reticulated veins. The catkins of the male are long, the stamens of a purplish red colour. Instances of hermaphrodite flowers are mentioned as having been found on some trees in England, but they are very rare. Its roots run near the surface, and it throws up numerous suckers, on which account it ought never to find a place on lawns or the vicinity of gardens. In addition to the list of Tacamahacs mentioned by Loudon, we may add, a very fine round-headed tree at Belford,* about fifty feet high, with a trunk, at a foot from the ground, seven feet nine inches in circumference; at Twizell, about eighteen years planted, it is thirty-five feet high, and three feet girth at the base.

The leaves are the favourite food of the caterpillar of *Smerinthus populi* as well as of some of those of the genus *Cerura*, also of that of *Notodonta ziczac*, &c.

Nearly allied to the Tacamahac is the *Pop. candicans*, Ontario Poplar, also introduced from North America, and cultivated sparingly for the last thirty or forty years as an ornamental tree. Its leaves are heart-shaped, and much larger than those of *Pop. balsamifera*, and when young it is not quite so fastigiate in its growth.

* Our first figure is a portrait of this tree, that on the opposite page of younger growth, showing its usual form.

The buds are large and covered with a gummy substance, but the odour, though approaching to that of the Tacamahac, is even more agreeable and perceptibly different. It grows rapidly at first in a rich moist soil, but seldom attains the dimensions of a very large tree, and it possesses the same disadvantage that attends so many of the tribe, that is of throwing up suckers to a great distance around; we can, therefore, only recommend it as a variety to be planted in woods, or where the underwood it produces is not considered a nuisance. It is readily propagated by cuttings as well as by suckers, as is the case with the Tacamahac.

The wood is soft and not of much value, at least we have not heard anything in its favour, or of its applicability to particular purposes.

Genus *Alnus*. TOURNF.

Nat. Ord. Betulaceæ. LINN. *Syst. Monœcia Tetrandria.*

Alnus glutinosa. GÆRT.

THE ALDER.

Alnus glutinosa, GÆRT. ii. p. 54.
SMITH'S Eng. Flor. iv. p. 131.
HOOKER'S Flor. Scot. 271.
LOUDON'S Arb. Brit. part. III. ch. civ. p. 1678.

THE specific characters of this species, as contained in our best botanical authors, are, leaves roundish cuneiform,

wavy or obtuse lobed on the margin, serrated, and somewhat glutinous, downy at the branching of the veins beneath.

The Alder is one of the commonest of our indigenous trees, being found upon the margins of all our rivers and streams, as well as in damp and marshy ground, and even in morasses and swamps of the wettest description. It is only, however, where the soil is good and at the same time well watered, but not actually swampy, that it attains a large timber-like size; under such favourable circumstances it often reaches a height of fifty or sixty feet, with a trunk of many feet in circumference; of such a magnitude are the fine specimens still existing in the bishop's park at Auckland Castle, and which we find mentioned in Gilpin's "Forest Scenery," and such are many of those which his accomplished editor, Sir T. Dick Lauder, describes as growing upon the banks of the Findhorn and its tributaries, and to these might be added many others which we have met with in our excursions in Scotland and in the north of England. In other situations less congenial to its full developement, whether from an excess of moisture as in swamps, or on the contrary where the ground is porous and the roots cannot retain the

requisite quantity of moisture, it becomes stunted in its growth, and is usually seen as a low scrubby-looking tree, seldom rising above twenty or thirty feet in height, and frequently not beyond the dimensions of a large bush. It possesses a very wide geographical distribution, being found throughout the whole of Europe in localities suited to its nature, as well as in the north, the east, and west of Asia, in northern Africa, and a species said to be identical with it inhabits Canada and other parts of the north-west coast of America.

Associated with scenery of a certain description, such as the banks of a stream, whether it be of the slowly-gliding kind, as that of the sluggish Mole, which in Gilpin's estimation derives its principal interest and effect from the presence of this tree, or of the rocky-bottomed and swift-running rivers of the northern parts of the kingdom, the Alder is always an expected, and at the same time a pleasing picturesque adjunct. In cases of the former description it ornaments and gives value to scenes, which otherwise would be tame, nay, unsightly ; and in the latter, from the appropriateness of its presence in the vicinity of the limpid fluid, it gives even an additional value to that varied and romantic scenery which their wild and often precipitous banks present.

It is not however from association alone, or the effect produced by combination with other objects, that we look upon the Alder with a favourable eye ; individually and independent of extraneous circumstances we consider it to be a tree of no mean merit in an ornamental point of view, at least in those instances where it has been allowed to attain its largest dimensions, and been favoured by soil and situation. Its form, in such cases, is often imposing as well as picturesque, assuming, as Sir T. D. Lauder

observes, "much of the bold resolute character of the oak;" and though the deep and dusky green of its foliage has been objected to as investing it with a melancholy aspect, we think that this gives character to the tree, and enhances its interest; and even if its foliage be less generally pleasing than tints of a lighter and livelier hue, the defect, if allowed to be one, is compensated by the retention of its leaves to a very late period of the year, as it is frequently quite green long after the other trees of the forest have become entirely denuded.

Favourable, however, as our opinion of the Alder may appear to be, viewing it as an ornamental tree, and much as we should regret its disappearance from scenery where it is an expected and natural attendant, we are far from advocating its cultivation upon an extended scale, or as a profitable timber-tree; on the contrary, we advise the planter to be chary in admitting it into his grounds, and when he does, always under certain precautions and in limited numbers. In many treatises on planting we find the Alder mentioned, and recommended as a proper plant to fill up moist tracts in woods and artificial plantations; but the authors who thus recommend it, seem not to have been aware that in so doing they were giving directions which, if adopted, would soon convert into a complete morass or bog, ground that otherwise by draining and planting with trees of a different nature might be rendered comparatively dry and productive. Such, however, is the nature of the Alder, that wherever planted it attracts and retains the moisture around it. This effect is occasioned by the nature of its roots which are chiefly composed of a huge mass of small fibres, whose capillary attraction is always in action, and prevents the escape of the redundant water in the vicinity of the plants. This pro-

perty of creating swamps we have repeatedly observed in the Alder, and from experiments we have made, are fully convinced that a plantation of Alders would soon render the ground (even should it be previously of tolerably sound and dry quality,) soft and spongy, and in time convert it into a decided bog.

The Alder, therefore, in our opinion, ought never to be planted in low bottom ground of a moist or wet nature, (except in particular localities, such as where it is cultivated in the coppice or holt fashion, for the valuable charcoal it produces); if introduced at all, it ought to be where it cannot well retain the water in any quantity around its roots. All moist and spongy land we would recommend to be well drained by open cuts, and then planted with trees whose roots, instead of retaining water, act rather as drains; such are some of the poplars, the ash, &c., whose roots are thick, and extend horizontally to a great distance on every side.

The wood of the Alder is soft and of a homogeneous texture, possessing but a moderate share of lateral and longitudinal adhesion; submerged in water or buried under ground it is almost incorruptible, and on this account, both in ancient and modern times, has been extensively used for piles in the foundation of bridges,* and other water works; exposed to the alternation of dryness and moisture it rapidly decays, as a pole or a post will not stand good for more than a year, but under cover and kept always dry it is very durable and remains unchanged, provided it has previously undergone some preparation, such as impregnation with smoke or pyroligneous acid, or has been saturated with a solution of lime

* Evelyn informs us that the bridge of the Rialto, at Venice, is founded upon piles of the Alder.

in moss water to prevent the access of the small beetle (*Anobium striatum*), which would otherwise soon attack, and perforate it with its galleries.

In Scotland and the north of England it is frequently made into chairs and tables, the latter of which, when formed of the planks of old and knotty trees, are very beautiful, exhibiting, as Sir T. D. Lauder expresses it, "all the beauty of the curled maple, with the advantage of presenting a deep rich reddish tint." Its principal value, however, at present, is for sawing up into herring-barrel staves, for which the demand is yearly increasing, and for this purpose it is annually felled to a great extent upon all the banks of the Highland rivers. Bog Alder, or wood that has lain long in peat mosses, is as black as ebony, for which it is often substituted, but it may be detected by its want of lustre.

The wood when standing is white, but the moment it is cut into, the surface of the wound becomes of a deep red, which gradually fades into a flesh colour, which it ever afterwards retains. The bark contains a large percentage of tannin, and is used by the tanner with that of other trees; it is also employed for dyeing shades of red, brown, and yellow, and with copperas, (sulphate of iron,) produces a good black. As we have already observed, the charcoal of the Alder is very valuable, and considered one of the best in the manufacture of gunpowder; on this account it is cultivated as a coppice wood, or in holts by the proprietors of the various gunpowder manufactories, and cut over every five or six years. The ramification of the Alder is stiff and unyielding, and in very large and old trees assumes, in some degree, the appearance of that of the oak; the young shoots in saplings, and when in vigorous growth are trian-

gular, but afterwards become round. The bark in old trees is full of clefts and of a dark colour, and the leaves, before they expand, are beautifully folded longitudinally, between the two whitish green stipules which enclose them. The male catkins appear in the autumn, but they do not flower till the following spring, when the female catkins, in the form of small conical cones, are produced on branched footstalks near to them.

The Alder is best propagated from seeds, which always produce more vigorous plants than cuttings or truncheons, as recommended by Evelyn, Boutcher, and others; these no doubt may succeed pretty well when made of shoots of one or two years' growth, but when older and of a large size they are apt to fail. The seed should be gathered in autumn, as soon as the scales of the catkins begin to open, which indicates their maturity, and may be separated from them by spreading them upon a sheet in a dry room and frequently turning them over; some sow the seed in autumn, but as the young plants are apt to be thrown out by the frosts in early spring, this had better be deferred till the month of March; the seed beds should be composed of fine earth, and the covering very light, not exceeding a quarter of an inch in thickness. In five or six weeks the young plants appear, and by the end of the summer they will have

attained a height of from four to six inches; in the following spring they may be run into nursery rows, from whence, in the course of a year or two, they will be fit to transfer to their permanent stations.

The insects which feed upon the Alder are very numerous: among the coleoptera, we may particularize the larva of the *Callidium alni*, a handsome longicorn beetle, that feeds upon the living wood, making long galleries in the heart of young trees; the *Clytus arietis* is also found upon it. In some districts the larva of *Adimonia alni*, and a small species of jumping weevil are also common, as well as *Phyllobius alni*, another of the weevil tribe. Among the lepidopterous insects, we have found *Notodonta dromedarius*, *Lophopteryx camelina*, *Acronycta psi*, *Geometra ulmaria*, besides several of the smaller species belonging to the *Tortricidæ* and *Tineidæ*.

CUT-LEAVED ALDER.

Among the varieties of the Alder, the *Al. g. laciniata*, Cut-leaved Alder, forms one of the finest and handsomest, growing with great vigour, and attaining a magnitude fully equal to that of the species; most of the trees recorded by Loudon, (some of which are stated to be upwards of seventy feet high,) belong to this variety, and as it bears a foreign and uncommon aspect and is not

met with in a wild state in Britain, it may with propriety be introduced in artificial scenery, where a plant so common as the indigenous Alder would be quite out of place.

Genus *Betula*, TOURN.

LINN. *Syst. Monœcia Polyandria.*

Betula alba. LINN.

WHITE, OR COMMON BIRCH.

Betula alba,

LINN. syst. pl. 1393.
SMITH's Flor. Brit. 1012. Id. Eng. Flor. iv. p. 153.
HOOKER's Flor. Scot. 274. Id. Brit. Flor. ii. p. 411.
LOUDON's Arb. Brit. ch. civ. p. 1691.

The specific characters of this tree are thus stated in the English Flora; leaves ovate, acute, somewhat deltoid, unequally serrated, and nearly smooth.

This light, elegant, and airy tree, one of the chief ornaments of our wild and mountainous scenery, is too well known to require any particular or detailed technical description. Throughout Britain and Ireland it is found almost universally distributed in all hilly districts, as

well as upon commons and wild tracts, where the soil is poor or of a light and sandy quality. In Scotland it grows at an altitude of three thousand five hundred feet, being a higher zone than that attained by any other of our indigenous trees; but, as might be expected, at this height it is only met with as a low tree or bush. Its geographical distribution in other parts of the world is also very extensive. Throughout the warm and temperate parts of Europe it inhabits all the lofty mountain-

ous districts, at altitudes varying according to their respective latitudes or temperatures; thus, in the Apennines, it commences at a height of about four thousand seven hundred and sixty feet above the level of the sea, and reaches an altitude of six thousand feet. In Lapland the line of the Birch is one thousand nine hundred and

thirty-seven feet below that of eternal snow, and eight hundred and two feet above that of the *Pinus sylvestris*. In Russia immense tracts of country are covered with this timber alone, and Loudon remarks; that in the neighbourhood of Moscow it forms the prevailing tree in all the woods and pleasure-grounds belonging to the Russian nobility. It abounds in Sweden and Norway, is also

found in Iceland, and in fact its limits in Europe may be said to be bounded only by vegetation itself. In Asia also it holds a wide domain, inhabiting Siberia as far as the Altaic mountains, and appearing also in the far distant Himalayas. In North America Loudon supposes that it appears in the form of *Bet. populifolia*, though botanists consider that tree to be a distinct species; if, however, plants of *Bet. populifolia* are frequently raised from the seed of the common Birch, *Bet. alba*, as Loudon affirms to be the case, their identity, in our opinion, is proved by so convincing a fact. The most beautiful form of the Birch is that of the pendulous or weeping variety, or, as some call it, variation, which prevails in the highlands of Scotland and mountainous parts of Wales. It generally grows with greater rapidity, and attains a larger size than the common sort; on this account, as well as for its superior beauty, its seed is always collected by the nurserymen in preference to that of the other, so that purchasers are now almost certain of obtaining plants of this improved and superior kind.

Sir T. Dick Lauder has made a remark, which does not appear to have been noticed by other writers, "that in young Weeping Birches, there is a certain degree of roughness on the spray, as if it were the coagulation of a gum exuded from the pores, that never failed to indicate to us the tree which was ultimately to turn out of the pendulous variety." This we have long observed in regard to the plants purchased from the nurseries, and the result has almost invariably proved as Sir T. D. Lauder describes it. This exudation also exists, but in an inferior degree, in *Bet. populifolia*, another indication, we think, of its common origin with the *Bet. alba*;

and we have likewise observed it, though sparingly, upon the young shoots of *Bet. nigra* and *Bet. papyracea*.

In general estimation, as well as in the writings of many arboriculturists, the Birch is usually considered as a tree of a very inferior grade, almost worthless as timber,* and fit only to be grown upon land of too poor a quality to produce wood of a superior kind. Allowing its inferiority to several of our forest-trees, we think its useful properties are greatly underrated, and that, treated with a portion of that care and attention bestowed upon other species, it is equally if not better qualified to make a profitable return to the planter, than many trees we have been accustomed to admit into our mixed plantations. As a nurse or secondary to other trees, more particularly to the oak,† it is, with the exception of the larch, and perhaps upon good land of the gean, or wild cherry (*Cerasus sylvestris*), one of the best that can be used, as it not only occupies less room from its upright and semifastigiate growth, but from the smallness and lightness of its leaves, and the delicate nature of its spray, it is less liable to injure the trees it is designed to nurse and protect, either by overshadowing, or by lashing them in violent winds, than many other kinds that have been more freely introduced into mixed plantations, such as the wych-elm, the ash, the beech, &c.

The profit or return it affords in the way of thinnings, is also, in many situations, quite equal to, or even superior to that afforded by many other kinds of hard wood, as it becomes fit for certain uses some years before the others

* Evelyn speaks of it as the worst of timber.

† The Birch was extensively used as a nurse to the oak in the Duke of Portland's extensive plantations in Nottinghamshire.

have attained the size required, its growth being rapid, even upon inferior soils, especially where plants, reared from seed of the pendulous kind have been selected. Thus, for staves for herring and other fish barrels, the demand for which is now so extensive throughout Scotland and the north of England, the Birch attains a sufficient size in fifteen, or at most in twenty years, whereas the elm, the ash, and others, require several additional years to reach an equal diameter.

Upon a poor weak surface soil, but where the substratum is of a stiff clayey nature, and fit for the oak, we have found a mixture of larch, birch, and oak, the last intended to remain as the ultimate crop, to be the best and most profitable selection. In such a combination, the larch, which are planted in much greater numbers than either the birch or the oak, afford the first two or three thinnings, or until the birch have attained a profitable size, which they will do in eighteen or twenty years; the thinnings after this period may be either of the two kinds conjointly, or entirely of the birch, should the remaining larch promise to attain a large scantling; but should the latter show any inclination to taint or rot at heart, which it sometimes does at the age of fifteen or twenty years upon land of this quality, in that case it should form the whole of the thinnings until entirely exhausted, leaving the birch to be thinned out afterwards as the oaks require additional room. In plantations where the sweet chesnut is intended to form the principal crop, we believe that the larch and birch would prove the most eligible nurses. Upon poor light moist soils, mixed with the larch and the Scotch fir, it also proves the most profitable tree we can grow, and from its hardy nature, and rapid growth upon very

inferior soils, it ought to be freely introduced in belts and narrow plantations intended for shelter or breakwinds in open exposed districts.

As an ornamental tree in landscape gardening, the Birch is one of the most beautiful we possess, exhibiting a grace and elegance in its form and foliage that, if equalled, is not surpassed by any other of our indigenous trees, being, as Coleridge expresses it,

> ——————" most beautiful
> Of forest-trees, the Lady of the Woods."

Its introduction, however, into lawns and ornamental grounds ought to be regulated by the situation and circumstances of the place, for we agree with Loudon, that there are certain associations connected with this, and indeed with many other indigenous trees, where such happen to be the prevailing growth of the country, that are unfavourable to their use in artificial, or as he terms it "gardenesque" scenery: thus, it would be inconsistent and contrary to sound principles of taste, or rather, we should say, to the associations attached to this tree in its native habitats, to plant it upon lawns in the Highlands of Scotland, or in any districts where it is indigenous or the prevalent tree; though, as he observes, "in the neighbourhood of London, and many other parts of England, it may justly be admitted, even on lawns, as one of the most elegant of our ornamental trees."

In the romantic scenery of Scotland, the Weeping Birch forms one of its most beautiful and bewitching features; oft have we admired its graceful form, in the well-known pass of Killicrankie, on the shores of Loch Awe, the banks of the Spey, the Dee, and various other well-remembered

scenes, and oft have we, when thus enjoying our escape from our lowland home, been reminded of that passage in the " Isle of Palms," where

> ——————————— on the green slope
> Of a romantic glen we sat us down,
> Amid the fragrance of the yellow broom,
> While o'er our heads the weeping birch tree streamed
> Its branches, circling like a fountain shower.

The fragrance of the Birch is also an additional recommendation that it possesses; this it gives out at all times when in leaf, but more particularly in spring, when the leaves first expand, or after rain and heavy dews: and we cordially agree with Sir T. D. Lauder, that a few Birch trees should always be planted near a house, if it be only for the fragrance they emit.

As a wood the Birch may be deemed of a secondary quality; for, though under cover and protected from damp, its durability is considerable, it very speedily rots and decays when in contact with the earth. Its grain is rather coarse, but has a satiny texture, and its colour white, mixed or shaded with red. A vast quantity of Birch timber is annually cut up for the staves of herring barrels; and indeed this is the principal use to which it is now applied in the north of England and Scotland, except in some parts of the Highlands, where it is still the timber used in the construction of houses, and where not only the greater part of the household furniture, but also of agricultural implements are made of it. It is also used, together with the wood of the alder, for the soles of clogs, a kind of shoe much worn during winter by agricultural labourers in the north of England and Scotland.

Upon the Continent the wood of the Birch is more

highly appreciated, and applied to a greater variety of uses than in Britain. In parts of France it forms the felloes of wheels, and in Russia is converted to this and many other purposes. In Sweden, and other northern countries, it is made into furniture, but for this it must be of a great age, otherwise it warps, and is liable to the attack of the worm. In all these northern parts it is a tree of inestimable value to the inhabitants, as, in addition to the uses already stated, it affords one of the best and most ardent fuels, and in Sweden is that most generally used for the iron-smelting furnaces; the outer bark, also, which may be termed imperishable, (as it remains uncorrupted for ages,*) is used instead of tiles or slabs as a covering for houses, and so completely does it resist decay, that the Norwegians generally cover their bark roofs to the depth of a foot or more with earth: it also makes a coping for walls and other erections where protection from moisture is required; and, being very inflammable, is used instead of candles. By the Laplanders the bark is made into baskets, neat compact boxes, mats, as well as cordage for harnessing their reindeer; of it they also make their water-proof boots and shoes; the legs of the boots being taken entire from the trees, and therefore without any seam, and a piece of it with a hole cut so as to admit the head, forms an impenetrable cloak, or cape, in wet weather. From the leaves and young shoots a good yellow dye is obtained; but to enter into all the uses mentioned by authors to which the various parts of the Birch are applied, would occupy more space than we can afford.

* In the "Nov. du Hamel," we are informed that in the ruins of Dworotrkoi in Siberia, a piece of Birch wood was found changed into stone, while the epidermis, white and shining, remained in its natural state.

In England, when grown in artificial plantations, it is generally treated as a coppice-wood or undergrowth, and is cut down at the age of five or six years for brooms, hoops, crate ware, &c., or at the age of ten or twelve for fagot wood, poles, and small fencing. In Scotland, at the age of fifteen or twenty, it is fit for herring-casks, and when a fall takes place the trees are barked, and the produce sold to the tanners at about half the price of oak bark. The charcoal made from the Birch is excellent, and is extensively used in the manufacture of gunpowder, and it forms a fine crayon for the artist. From the sap obtained by tapping the tree in early spring a refreshing and wholesome beverage may be manufactured; upon which subject Evelyn is very diffuse, but our readers will obtain all the information requisite for the making of it in a much shorter recipe contained in the "Arboretum Britannicum." In Russia, the bark is subjected to distillation, and an oil is obtained, which is employed in the tanning of hides, and gives that powerful but not disagreeable scent peculiar to Russia leather, and which, when employed in the binding of books, is supposed to keep away the attacks of the *Ptinidæ* and other insects.

The Birch is now almost invariably raised from the seed, which ripens in September or October, and may either be sown as soon as gathered, or kept dry in some airy place during winter, and sown in spring: in the first case it vegetates early, but is sometimes apt to be cut off, or thrown out of the ground by frost; in the second it does not vegetate till May or June, but is then safe from any injury from the above-mentioned causes. The seed-bed should be composed of fine light rich mould, and when sown, the seeds, instead of being covered with earth, should be merely clapped down with the back of the

spade; and to defend them from winds and frosts if sown early, a little straw, pease-haulme, or other slight covering, may be thrown over them. In the following spring the seedlings may be drawn from the bed, and run into nursery rows, from whence they will be fit to transplant to their permanent stations in two years, or even in one, if small plants are preferred.

The Birch once planted requires very little attention or pruning, and indeed the knife should never be used except to remove a second or supernumerary leader. In districts where the Birch abounds, many seedlings annually spring up, and from this source nurseries when first established were almost entirely stocked, and some nurserymen are still supplied to a considerable extent in this way. It is asserted that these native seedlings root much better than plants taken out of a regular seed bed; but purchasers, we think, run a much greater risk of getting an inferior tree, than where care has been taken to select and gather seed from the finest specimens of the pendulous kind. The disease most common to the Birch shows itself in tufts or excrescences composed of small anastomosing twigs, upon the upper branches; these, when seen at a distance, resemble the nests of crows or other large birds. This disease seems to proceed from an extravasation of the sap, of the precise cause of which we are ignorant, though we think it more likely to originate from some contamination proceeding from the nature of the soil, than from the puncture of an insect. It is most prevalent upon ill-conditioned trees of the common sort, and though we have seen it affect them in a variety of soils, it is most common upon such as grow in that of a boggy or moorish nature.

Various insects and their larvæ feed upon the Birch; among the Lepidoptera we have found the caterpillars of

the following, in this district: of the Bombycidæ, *Leiocampa dictæa*, and *Lophopteryx camelina;* among the Noctuidæ, *Cosmia fulvago;* and of the Geometridæ, *Lampetia capreolaria*, *Lam. prosapiaria*, *Lam. defoliaria*, *Biston betularius*, *Cabera exanthemata*, as well as others belonging to the smaller moths. *Deporaus betulæ*, and *Rynchites betulæ*, belonging to the *Curculionidæ*, or weevil tribe, and which feed upon the leaves and buds, both in the larva and imago state, are among the coleopterous insects; the decaying stumps and trunks are the food of the *Rhagium inquisitor*, and *Leptura quadrifasciata*, beetles belonging to the *Cerambycidæ*, or longicorn division. The caterpillars of several *Tenthredinidæ*, or saw-flies, also feed upon Birch leaves; among these are *Cimbex femorata*, *Trichiosoma sylvaticum*, *Selandria betuleti*, and *Lyda betulæ*. Among the fungi which grow upon the decaying wood, we may notice the *Polyporus betulinus*, specimens of which we have often found eight or ten inches in diameter. The fleshy substance of the fungus, which is of a pure white, and of a corky or pith-like nature, when dried and cut into slices makes an excellent lining for insect boxes, and is also often used as a razor strop. The *Agaricus muscarius*, whose poisonous and extraordinary effects upon the system are described in a paper by Dr. Greville, contained in the fourth volume of the Wernerian Nat. Hist. Soc. Transactions, is also found in Birch woods.

Of the various American Birches none have yet been planted with a view to profit as timber trees, though several have for many years been cultivated for their ornamental qualities. Among these is the *Betula populifolia*, which Loudon supposes to be a variety of the common Birch; its foliage is handsome, but it does not attain the size of our native trees, and the wood is not superior in

quality. *Bet. papyracea* is another handsome species, and is the tree that affords the bark, of which the light canoes in North America are constructed. *Bet. nigra*, or the Red Birch of America, is another, but it appears to require a warmer summer than our own to bring it to maturity. *Bet. lenta*, from the superior quality of its wood, as well as its rapid growth and ornamental properties, well deserves the attention of our planters, and being a native of Canada, there is little doubt but that it would succeed and attain its full dimensions in most parts of Britain.

Nat. Ord. Corylaceæ.

Genus *Quercus*, LINN. LINN. *Syst. Monœcia Polyandria.*

THE OAK.

OF this numerous and most important genus, the various species of which are distributed throughout the temperate regions of the globe, Britain can only claim two as truly indigenous to her soil; these two, however, (if indeed specifically distinct,) are by far the most important of their kind, surpassing all other known species, not only in grandeur of form, bulk, and duration of life, but in the strength, durability, and general excellence of their timber, which for all purposes where these two qualities are essentially requisite, if equalled, at all events is not surpassed by that of any other European tree. Our navy attests its superiority in the construction of ships; while the sound and uncorrupted state in which it is found in buildings and other works of ancient date, is a proof of its general utility and fitness for every purpose where durability and strength is required. The rest of the Oaks, evergreen as well as deciduous, amounting, we believe, to upwards of one hundred and fifty botanical species, are all of exotic origin, and are distributed in the various regions of the globe either where these are rendered temperate by their latitudinal position, or in tropical climates by their elevation.

Of the European deciduous species, the next in rank

to the common Oak, in point of magnitude and other properties, is the *Quercus cerris*, Turkey Oak. This tree we are disposed to admit within the limits of our volume, not only on account of its ornamental qualities, which are considerable, but from a wish, if possible, to encourage its culture on an extended scale; being convinced, from the observations we have made, that it is a tree better calculated, from its rapid growth, and the nature of its timber, to repay the planter, than many others we are in the habit of introducing into our mixed plantations.

Of the evergreen or Ilex division, the common evergreen Oak, *Quer. Ilex*, a native of the southern parts of Europe, is the only one that has been planted to any extent, or that seems able to bear the vicissitudes of our climate, and to attain the dimensions of a second-rate tree. Its culture, however, is likely to be always restricted to ornamental purposes, as it is of too slow a growth and inferior a size to make it an object of profitable speculation to the planter; and its wood, though hard and durable, is very liable to split and crack in drying.

Of the various North-American Oaks, many are distinguished for the beauty of their foliage, particularly those whose leaves in Autumn become of a rich red, or scarlet tint; their timber, however, is open in texture, and generally very inferior to that of our own species, or even to that of *Quer. cerris*, with the exception of *Quer. alba* and *Quer. virens*, two species highly valued for naval purposes in America, but neither of which are likely to succeed in this climate; the introduction, therefore, of the American Oaks, is likely to continue on a limited scale, and more for the variety and ornament their foliage produces in our pleasure-grounds, than from any expectation of profit from the timber they produce.

In addition to the hard and durable quality of the wood of many members of this genus, the bark of all the species contains a large proportion of tannin and gallic acid, and is more extensively used in the manufacture of leather than that of any other tree; the bark of *Quer. tinctoria* also affords a very valuable yellow dye, and the oak-galls which are produced by the puncture of certain insects, and are a receptacle for their eggs and larvæ, form an extensive article of commerce, and besides being the chief ingredient in the manufacture of ink, are much used for dying black. From the *Coccus Ilicis*, or *Kermes*, a small hemipterous insect that infests a species of the Oak, a fine scarlet dye is obtained, which appears to have been known from a very remote period; the use of this insect has, however, of late years, given place to the cochineal, another member of the same family, inhabiting South America, where it is found upon certain species of Cactus.

The acorns, also, of the Oaks, besides forming an important portion of the food of various animals and birds, are many of them edible, and a wholesome human food. In Spain they are extensively consumed as a fruit, and we have tasted of some from that country equal, if not superior in flavour to the finest chesnuts. The species which produce the finest edible acorns are said to be the *Quer. ballota*, *Quer. esculus*, and *Quer. Grammuntia*, of botanists and the catalogues, all belonging to the evergreen section.*

* According to the author of "Sketches in Spain," the *Encina* of that country, which bears such delicious and highly-prized acorns, is identical with the *Q. Grammuntia* of authors; it further appears that this species prevails throughout the greater part of the Peninsula, and is the natural growth of the soil. It is, therefore, to be regretted that a more appropriate name had not been given to it, as it no longer exists in the locality from whence it took the appellation, and where, in all probability, it had been planted; the wood at Grammont, near Montpellier, we believe, being no longer in existence.

By many modern botanists, our common Oak, the *Quercus Robur* of Linnæus, is supposed to include two distinct species, distinguished from each other by the following characters: the one with the acorns supported on short stems, or as it is termed pedunculated, and the leaves subsessile or with very short petioles, the other with the fruit sessile, but the leaves petiolated: to the first, which is the prevailing kind in Britain, and which we may term the common Oak, they give the title of *Quer. pedunculata*; to the second, which is also met with in many parts, and is frequently found growing commingled with the other kind, that of *Sessiliflora*.

Of this specific division we speak with diffidence, as it is supported by the authority of various eminent botanists, who are more competent than ourselves to determine what constitutes a species. Our own impression, however, is, that they are rather to be considered varieties than species, and this supposition, we think, is strengthened by the fact that intermediate forms,* both in regard to the position of the fruit and the form of the leaves, are frequently met with, and these are found to run so much into each other, and sometimes to partake so equally of the characters of both kinds, as to render it difficult to determine to which they show the greatest affinity, thus connecting, by gradual approaches, the two supposed species, however distinct each may appear when viewed in its typical form, or where the variation is at its maximum. We may add, that in the general form, outline, and dimensions of the two trees when arrived at maturity, no striking or marked difference is perceptible, and though the quality of the timber of the sessile-flowering kind

* See Rev. W. T. Bree's communications and list of specimens in vol. xii. p. 571 of "Gardener's Mag." and "Arb. Brit." p. 1738.

is said to be inferior in strength and durability to that of the *pedunculated*, it is used indiscriminately with the latter by workmen for all purposes to which Oak timber is applicable, and even in ship-building the one is used in common with the other.

In treating of the British Oaks, we shall, in accordance with the views of botanical authors, give the distinguishing characters of the two supposed species under their appropriate titles, with such cursory remarks as may apply to them individually, after which we shall proceed to such observations as are equally applicable to both kinds, their general and statistical history being so closely interwoven as to render any attempt at separation in this respect almost impossible.

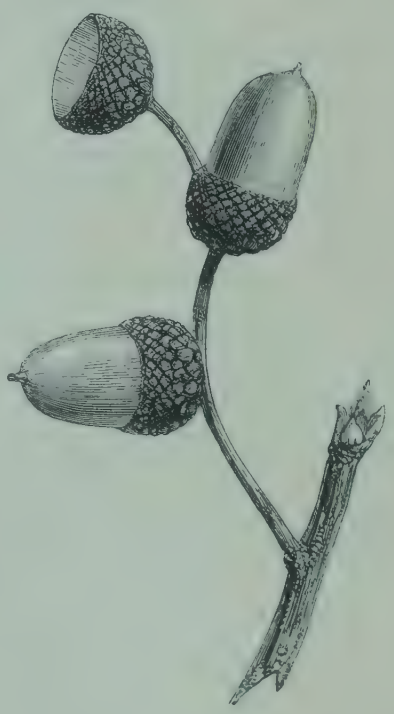
Quercus (robur) pedunculata. WILLD.

PEDUNCLED, OR COMMON OAK.

Quercus pedunculata,	WILLD. sp. pl. No. 65.
	LOUDON'S Arb. Brit. part III. ch. cv. p. 1731.
Quercus robur,	LINN. sp. pl. p. 1414.
	SMITH'S Br. Flor. 1026. Id. Eng. Flor. iv. p. 148.
Quercus robur pedunculatum,	MARTYN'S Flor. Rus. x.

LEAVES deciduous, oblong, smooth, dilated upwards, sessile, or with very short petioles, the lobes obtuse, with rather acute sinuses, the stalks of the fruit elongated,

acorn oblong. Such are the botanical characters assigned to the peduncled Oak, taking it in its common typical form. It is subject, nevertheless, to vary, and undergo considerable modifications in the shape of the leaves, both as regards the depth of the sinuses and the number of the lobes, as well as in the existence or total want of a petiole; the form and size of the fruit, also, are dissimilar in different trees, and the fruit-stalks vary greatly in their length; in some instances being upwards of an inch long, in others very short, and nearly sessile, or intermediate, as it were, between what may be called the typical forms of *Quer. pedunculata* and *Quer. sessiliflora*, which has induced some to consider such instances as Hybrids, though the fact of their producing fertile seeds militates, we conceive, against such a supposition, and is rather in favour of the common origin of the two supposed species. A great difference is also observable in regard to the period of coming into leaf, and casting the foliage in autumn, some trees expand-



ing much earlier than others, though growing upon the same quality of soil and within a few yards of each other,* and many remain green long after others have assumed the autumnal russet tint, or entirely lost their leaves; differences of form are also observable, some preserving a round or globular head, others a more fastigiate and upright growth; in short, innumerable variations and modifications in all the particulars above-mentioned, may be observed in Oak woods of any considerable extent. Among the different varieties of the common Oak enumerated by authors, the *Quer. fastigiata* appears one of the most distinct and remarkable, resembling, in its general form and growth, the cypress, or the Lombardy poplar, and on this account is named by the French, *Chêne cyprès.* It is a native of the Pyrenees, where it was observed by Captain Cook, now Captain Widdrington, R. N., and is also met with in the Landes near Bordeaux, and in the Basse Navarre. The Pendulous Oak, of Moccas Court, Herefordshire, is another interesting variety, and we may remark, that most of the plants raised from the acorns of the parent tree partake, in a greater or less degree, of its weeping character. There is also a laciniated or Cut-leaved Oak, another with variegated leaves, and a third with leaves tinged with purple when they first expand, enumerated among the varieties of this tree, by Loudon, in the "Arboretum Britannicum."

* At Twizell, there is an instance of an Oak of this kind, *Quer. pedunculata*, that invariably comes into leaf nearly three weeks earlier than any of its neighbours. The Cadenham Oak, in the New Forest, annually expands a few leaves at Christmas.

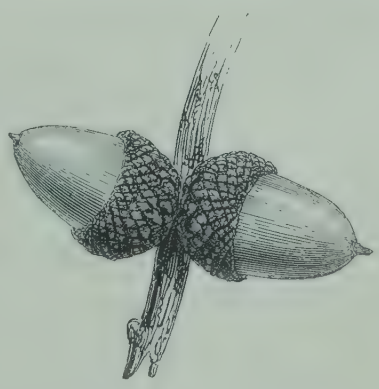
Quercus (robur) sessiliflora. SALSB.

SESSILE-FRUITED OAK.

Quercus sessiliflora,	SALSB. prod. 392.
	SMITH's Flor. Brit. 1026. Id. Eng. Flor. iv. p. 150.
	LOUDON's Arb. Brit. part. III. ch. cv. p. 1786.
Quercus robur,	WILLD. No. 64.
Durmast Oak,	MARTYN's Flor. Rus.

THE distinguishing characters of this Oak, as given by Sir J. E. Smith, and other botanists, are, leaves on elongated foot-stalks, deciduous, smooth, and oblong, the sinuses opposite and rather acute, the lobes obtuse, the

fruit sessile, oblong. In other respects, as to general form and magnitude, it closely resembles the common Oak, indeed so much so, that, of the numerous trees recorded in various parts of Britain, for their enormous dimensions, age, and other peculiarities, the variety or species to which they belong, has, in many cases, never been mentioned or ascertained. According to some writers, the *Quer. sessiliflora*, is said to have a more lofty and pyramidal growth than the *Quer. pedunculata*; but this, judging from the various specimens we have examined, the characteristic drawings of Mr. Strutt, and the excellent outlines of both kinds figured in the "Arboretum Britannicum," does not appear a character upon which much dependance can be placed. Loudon states his belief that no important or constant difference exists between the mode of growth of the two kinds, "because," he observes, "we have found individuals of the one species, as pyramidal, fastigiate, or orbicular, as we have found any of the other;" and the Rev. W. T. Bree, who writes in the "Gardener's Magazine"* upon the *Quer. sessiliflora* and its varieties, remarks, that there



* "Gardener's Magazine," vol. xii. p. 571.

is little difference in the general form and outline of the two trees when full grown, at the same time he feels "that there is a certain indescribable something about the trees, by means of which he can always distinguish each, without examining either the acorns or leaf-stalks."

A close examination, we allow, of the two kinds, at least of trees where the peculiar characters of each are most distinctly developed, shows a difference, both in the naked tree and when clothed with leaves, that to the practised eye becomes appreciable and readily recognised; thus, we find that in *Quer. sessiliflora*, the growth of the spray, or branching, is freer and less tortuous than in *Quer. pedunculata*, that the leaf-buds are larger, and the bark in general much whiter in colour; the leaves, also, when expanded, are usually larger, and from the length of their petioles hang more loosely, and present a less tufted appearance than they do in *Quer. pedunculata*. In regard to the quality of the timber of *Quer. sessiliflora*, there are various opinions, some having considered it inferior, both in strength, toughness, and durability, to that of *Quer. pedunculata*, while others estimate their relative properties to be nearly upon a par; that the latter is the more correct opinion of the two appears to be established from the comparative trials and experiments that have been made, which show that in strength, elasticity, and toughness, the *Quer. sessiliflora* is fully equal if not superior to *Quer. pedunculata*, and were it not for the supposition of its inferior capability of withstanding the vicissitudes of dryness and moisture, that is, its more perishable nature between wind and water, it would be even superior to the *Quer. pedunculata* for ship-building.

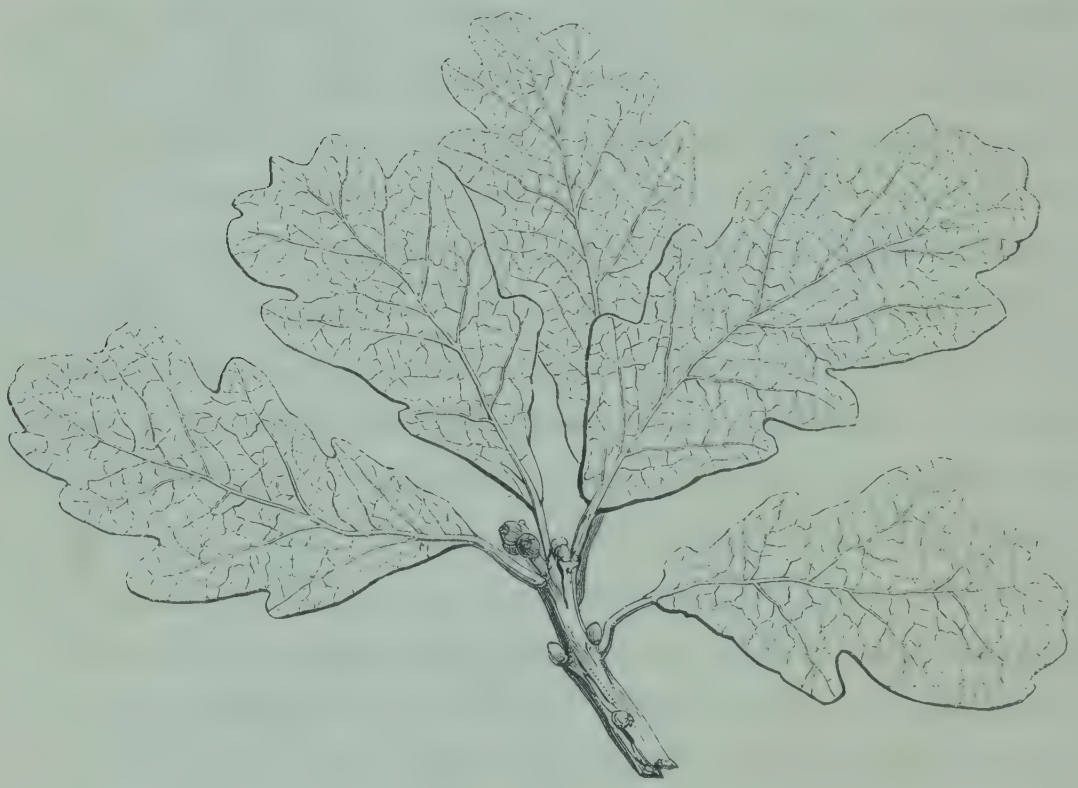
A further proof that its wood is not generally considered of inferior quality to that of *Quer. pedunculata*,

is that the timber of both kinds has always been indiscriminately used for the most important purposes, such as ship-building, house-rafters, &c., which would scarcely have been the case had the produce of *Quer. sessiliflora* been known to be, and invariably found, of a quality inferior to that of *Quer. pedunculata.* Our own opinion is, that there is not any such material difference between the qualities of the timber of the two trees as has been asserted by some, but that inferior timber is occasionally produced by each variety,—the result, perhaps, of some original constitutional defect, or arising from the nature of the soil, situation, or other local peculiarities of the ground upon which the timber has been raised. Such, at least, is the result of our own experience, as we have met with oak of the *peduncled* kind, with timber possessing all the inferior qualities attributed to and supposed to be possessed exclusively by *Quer. sessiliflora.*

The grain of the wood of *Quer. sessiliflora* is generally less varied and of a more uniform and deeper colour than that of *Quer. pedunculata*, and with less of that laminated appearance which is called the *flash* or silver grain ; and it is now ascertained that the timbers found in old houses, and other ancient buildings in different parts of the kingdom, and which were long considered to be formed of the wood of the sweet chesnut, are, in reality, composed of Oak, and mostly of the sessile-fruited kind. We are only surprised how such a belief ever obtained credit, considering that the chesnut does not appear to be of indigenous growth, that at no period has it prevailed in Britain as a forest tree, and indeed does not even appear to have grown at any time in many districts where house timbers of this description have been found.

The Durmast Oak of Martyn's " Flor. Rustica," the

Quer. sessiliflora var. B. of Smith's "Eng. Flor.," and by Loudon supposed to be the *Quer. pubescens* of Willdenow's *Abbildung*, seems merely a variety of the *Quer. sessiliflora*, where the deviation from the *Quer. pedunculata* is at its maximum. In this variety the leaves are less deeply cut, more numerously sinuated, with their under surface of a pale glaucous green, and when first excluded from the bud, covered with a hoary pubescence. It is found in the New Forest, where it is known by the above-mentioned name, and is also met with in other districts, but is far less common than the usual form of *Quer.*



sessiliflora. Of this well-marked variety there are two trees now growing in the grounds at Belford Hall, Northumberland, the seat of the Rev. Dixon B. Clark. From acorns gathered from these trees we have raised several plants, none of which yet resemble their parents in the appearance and colour of their foliage; but this may be

owing to their age, the largest of them not being more than six or seven years old.

We now proceed to such observations as apply to both the British Oaks, for as we have already observed, their statistics are too closely interwoven to allow of being separately treated, and what we have to say in regard to the culture, management, and properties of the one is equally applicable to the other.

The Oak is indigenous throughout Britain, and in former ages, before the clearing away of the forests had commenced, appears to have covered a very large portion of its surface, for even in districts where the natural or self-sown Oak is now rarely seen, the remains of noble and gigantic trees are frequently met with, sometimes in the alluvial deposits on the margins of our rivers, or in boggy places, covered with a layer of peat moss, which has been generated around them by the stagnation of the water caused by their fall. Examples of this kind are frequent in our own county (Northumberland), and we know of several trees of large dimensions that have been exhumed in tracts where, at the present day, scarcely an Oak of any great age, or that has attained one-fourth the size of those former denizens of the forest, is now to be met with. At Linden, the seat of Charles W. Bigge Esq., the trunk of a magnificent Oak was extracted from a peat moss, that fills a small basin or hollow, evidently produced by the stagnation of a stream which now passes through it, and which at some distant period had been dammed back by the fall of the trees upon its margins. This Oak was covered by a layer of the peat to the depth of about three feet, and was discovered by probing the moss. The trunk, with a small portion of one of the larger limbs, was with great labour and difficulty dragged from its miry bed. The

contents of the portion recovered contained five hundred and forty-five cubic feet, although the whole of the sap wood had perished.

The timber was perfectly sound, and the tree, by whatever accident it had been overthrown, had fallen in the vigour of its growth. When sawn up, the interior planks were found of a deep rich brown colour; those nearer the exterior darker, or approaching to black. A variety of elegant furniture has been made from the wood, but it has been found necessary for fine cabinet-work to have it cut into veneers, as, when worked in bulk, it is apt to crack and become warped. The remains of other large Oaks have also been met with upon the banks of the Tyne, the Alne, and other rivers, as well as in various bogs and morasses, and we mention these instances to show in a district where, at the present day, nothing but recently-planted Oak, or dwarfish timber from stock shoots exists, that in former times the monarch of the forest grew luxuriantly and attained a splendid developement, and also as an inducement to the planter not to neglect the liberal insertion of this national tree wherever soil and situation are found congenial to its growth. In other parts of England the Oak still grows in all its native magnificence of form and dimensions, and the remains of those ancient forests which are chronicled by our earliest writers, and which, in the time of our Saxon ancestors, spread over the greater portion of the country, are still to be traced in the venerable but living relics of enormous Oaks, many of which are supposed to number more than a thousand years.

To give a detailed account, or even to enumerate all the various Oaks remarkable for their size and other peculiarities, which have existed or do still exist, would

occupy more space than the limits of this work will allow; this circumstance, however, we regret the less, as it may induce the reader to turn to the interesting pages of the "*Amœnitates quernæ*," of the late Professor Burnet, in which work the historical facts, legends, &c., connected with the history of individual Oaks of ancient date, are amply discussed, to the magnificent "Sylva Britannica" of Strutt, or to the "Arboretum Britannicum," in which work, the counties being ranged alphabetically, an account is given of all the most celebrated Oaks that have existed or are now living in each of them. We shall, therefore, briefly mention a few of the largest Oaks on record, and afterwards point out others which, though in a state of decay, are still living, concluding our notice with such Oaks as are in a thriving or growing state, and which promise, in progress of time, to equal the dimensions of their most magnificent predecessors.

The solid trunk of a gigantic Oak is recorded by the Rev. Abraham de la Pryme, in the "Philosophical Transactions" for 1701; it was found beneath the level of Hatfield chase, in Yorkshire, by Mr. Edward Canby, and measured one hundred and twenty feet in length, was thirty-six feet in circumference at the butt end, thirty feet at the middle, and eighteen feet at the small end, where the trunk was broken off, so that by moderate computation, he adds, "this tree may have been two hundred and forty feet in height." Dr. Plott, in his history of Staffordshire, mentions an Oak at Rycote, under the shadow of whose boughs four thousand three hundred and seventy-four men could stand, and another at Norbury, forty-five feet in circumference. The Boddington Oak, in Gloucestershire, the remains of which were burnt down in 1790, was fifty-four feet in circumference at the base,

and Damory's Oak, in Dorsetshire, which was sold and cut up for firewood in 1755, was sixty-eight feet in circumference at the ground: both of these were hollow trees.

Of those still existing and remarkable for age and size, the Winfarthing Oak is said to have been an old tree at the time of the Conquest; Cowper's Oak, in Northamptonshire, is supposed to have been planted in the time of William the Conqueror; the Salcy Forest Oak, in the same county, boasts a much greater age, as it is supposed to have seen one thousand five hundred seasons, its trunk is forty-six feet in circumference; the Flitton Oak, in Devonshire, of the *sessiliflora* variety, supposed to be one thousand years old, is thirty-three feet in circumference at one foot from the ground; the Cowthorpe Oak, in Yorkshire, is seventy-eight feet at the ground; the Hempstead Oak, in Essex, fifty-three feet, and the Merton Oak, in Norfolk, sixty-three feet in circumference. In Scotland, also, the remains of magnificent Oaks still exist: amongst others may be particularized the Wallace Oak, at Ellerslie in Renfrewshire, amidst whose branches it is said the patriot and three hundred of his followers hid themselves from the English. At Lockwood, in Annandale, Dumfriesshire, the ancient seat of the Johnston family, we visited, about three years ago, the grove of Oaks which surrounds the remains of the ancient castle, and remarked one of still vigorous growth, with a circumference, a little above the ground, of sixteen feet. In the same county, during the tremendous hurricane of the 7th of January, 1839, a remarkable Oak called "the three brothers," so named from the three stems or limbs of which it was composed, was blown down, the solid contents of which were found to be five hundred and sixty-one feet eight inches.

In Roxburghshire, near Jedburgh, stands the King of the Woods, a beautiful Oak of vigorous growth, with a trunk forty-three feet in height, and a circumference of upwards of sixteen feet, and near to it the Capon tree, figured above, a short-stemmed but very wide-spreading Oak, with a circumference at the base of twenty-four feet, the legend attached to which is, that it served as a trysting place for the border clans in bygone times. These two trees are supposed to be the remains of the ancient forest of Jed. In Inverness-shire, at the head of Loch Gary, Sir T. Dick Lauder* found the remains of a prostrate Oak forest upon the surface of the solid ground, among which he measured one tree with a clean stem twenty-three feet in length, sixteen feet in circumference at the butt end, and eleven feet towards the smaller end under the fork; the wood, with the exception of an inch or two on the external part, appeared perfectly fresh, although it must

* Lauder's "Gilpin," p. 272.

have lain for many years in that situation, as a fine old birch wood grew upon the ground it had occupied; Sir T. D. Lauder adds, that the stock whereon this Oak had grown and close to which it lay, was worn away in the centre, and so hollowed out as to encircle a large and thriving self-sown birch tree of more than a foot in diameter.

Of Oaks, still in vigorous health and increasing in size, the Squitch bank Oak, in Bagot Park, Staffordshire, the seat of Lord Bagot, seems one of the largest, being upwards of forty-three feet in circumference at the base, and sixty-one feet high; its solid contents, a few years ago, were found to exceed one thousand and twelve feet. The Beggars' Oak, in the same Park, is also a fresh and vigorous tree, with a trunk upwards of twenty-seven feet in circumference at five feet from the ground; it contains eight hundred and seventy-seven cubic feet of timber, and Sir T. D. Lauder informs us would have produced, according to the price offered for it in 1812, 202*l.* 14*s.* 9*d.* At Hazelgrove, in Somersetshire, is a noble Oak, eighty feet in height, and which measures thirty feet in circumference at four feet from the ground; this tree contains eight hundred and sixty-three feet of timber. At Nettlecombe Court, in the same county, is another Oak, eighty-five feet high, seventeen in circumference near the ground, and which contains six hundred cubic feet of timber. The Woolton Oak, Buckinghamshire, possesses all the characteristics of a magnificent and picturesque tree, and by some is considered one of the finest in England, even surpassing, in characteristic beauty, the Chandos Oak, which grows in the same county, in the grounds of Michenden House; this tree is now in the highest health and vigour, and its wide-spreading, umbrageous

head covers a circle whose diameter is more than one hundred and eighteen feet. The great Panshanger Oak, in Herts, is another magnificent tree, of great beauty, and well balanced form, and though upwards of one hundred and fifty years old, is only approaching its prime; when last measured, it was found to contain more than one thousand feet of solid timber.

Innumerable other thriving specimens of Oaks might be instanced in various parts of the kingdom, as scarce a park exists that does not boast of vigorous trees, in different stages of growth, many of them promising to equal the finest specimens of recorded British Oaks, and which, there is little doubt, if allowed to attain their utmost longevity, will, at some far distant day, emulate the gigantic remains of those we now survey with admiration and astonishment.

At Hedgeley, in Northumberland, we lately saw an Oak thirty-seven years old, that had attained a circumference of five feet six inches about a foot above the ground. It is the produce of an acorn planted in the place where the tree stands.

During the Saxon rule and even for some time after the Conquest, Oak forests were chiefly valued for the fattening of swine, and in times of scarcity, acorns were not disdained as human food. Laws relating to pannage, or the fattening of hogs in the forest, were enacted during the heptarchy; and by King Ina's statutes, any person wantonly injuring or destroying an Oak tree, was mulcted in a fine, varying in extent according to its size, or the quantity of mast it produced, and we may further judge of the value attached, in those days, to this kind of produce, when we find that the pannage of two hundred hogs was deemed a fit portion for a princess, and that dona-

tions of monarchs to their retainers often consisted of the produce of a portion of Oak forest.

The durability and fitness of the Oak for naval purposes seems to have been appreciated from a very early period, and long before any records we possess, for in the "Journal of Science" (vol. i. p. 244) Sir Joseph Banks mentions the finding of an ancient canoe in Lincolnshire, in April 1816, at a depth of eight feet below the surface, when cutting a drain parallel with the river Witham, about two miles east of Lincoln,— it was hollowed out of an Oak tree, and measured thirty feet eight inches in length, and three broad in the widest part; several other canoes of a similar construction have been discovered in the same county and near to the same locality, and as vessels of a much superior build were in use, long before the time of Alfred, a very ancient, and in all likelihood a date anterior to the invasion of the Romans, may pretty confidently be assigned to these primitive vessels which, as Professor Burnet observes, "are only found amongst the rudest people and in the earliest stages of society." In the time of the Saxons, their numerous ships, or rather oared galleys, were built of Oak; and after the Conquest, the British navy was fostered with great care, and as early as A. D. 1214, in the reign of King John, the right of England to the dominion of the seas was proclaimed. It was not, however, till the time of Henry the Seventh that three-masted vessels, or ships approaching in magnitude and form to our present men-of-war, were built, although cannon had been used aboard ships as early as 1380.

Oak timber was also used almost exclusively for all building and carpentry purposes; the timbers of the oldest buildings are uniformly of Oak; it formed the roofing, as well as the interior decorations, of our ancient churches

and cathedrals, as we see it exhibited in the beautiful tabernacled stalls of that of Gloucester, in the shrine of Edward the Confessor in Westminster Abbey, and in various other ancient edifices. It roofed our old baronial castles and halls, and also panelled their rooms of entertainment; and the massive tables and other household furniture with which they were provided, were generally fabricated of the same durable material. It was also used from the earliest period in all exterior works where strength and durability were required, such as piles to strengthen and secure foundations of buildings, bridges, &c.; and its durability and almost imperishable nature for water-works is proved by the sound condition, in which it has been found after the lapse of ages, in one instance, viz., that of the stakes driven into the bed of the Thames to prevent the approach and landing of Julius Cæsar, of nearly two thousand years.

The decrease of the Oak forests in Britain was, for long after the Conquest, very gradual, as in Henry the Second's time the greater part of England appears to have been covered with wood, consisting principally of Oak, and about that period London was surrounded by a large forest, "in the coverts whereof (so says Fitzstephen) lurked bucks and does, wild boars, and bulls;" and even so late as the reign of Henry the Seventh, Polydore Virgil informs us that the forests covered nearly one third of all England. It appears, however, soon after this period, in consequence, we may presume, of the increasing population, the advance of civilisation, and the greater demand for agricultural produce, and perhaps, also, by a partial relaxation of the severe forest laws in regard to the preservation of game, the axe, and other means of destruction must have been freely applied, as it was deemed necessary,

in the reign of his successor, to enact a law enjoining the replantation of forest-trees, and in the 13th of Elizabeth further enactments were required for the preservation of the royal woods. These suffered again most severely during the civil wars, and so great was the destruction of the Oak, during these unsettled times, that serious apprehensions of a failure of timber for the support of the navy, began to be entertained in the succeeding reigns; and in that of William the Third a statute was passed, empowering commissioners to enclose at once two thousand acres of the New Forest, and to add annually two hundred more for the space of twenty years; since then, the national woods have been more strictly looked after, and a breadth of land to the extent, we believe, of fifty thousand acres, is now planted, and as an improved system of management has been adopted, we may hope that it will to a certain extent answer the intentions proposed by the legislature.

It is not, however, to the royal forests we are to look for the principal supply of our naval timber, but to the encouragement given to planting by the remuneration private proprietors reap from the cultivation of the Oak;* and though its value may be lessened, as compared with what it produced during the period of the late war, when Oak bark had risen to an enormous price, in some years having amounted to fourteen, sixteen, and even eighteen pounds per ton, still the present price of Oak timber, for ship-building, and for which the demand seems annually increasing, is sufficiently encouraging, (low as now may be the comparative value of the bark,) to induce any one who plants to introduce a due proportion of this valuable tree.

There may, perhaps, be some who suppose, from the

* Ten Oak trees were sold by Sir George Cornwale, Worcestershire, for 1100*l.*

slower growth of the Oak, and the length of time it requires to attain maturity and size to qualify it for ship-timber, that they are likely to gain more and within a shorter period, by plantations composed of other trees without any admixture of Oak. Such an opinion we conceive to be erroneous, at least with respect to all soils in which this tree will thrive, for we believe that greater advantages and equal profit may be obtained from mixed plantations, in which the Oak has been introduced in sufficient quantity to stand as an ultimate crop, for the number of plants required for this purpose, and the room they occupy when quite young and for many years afterwards, is not such as to lessen materially the value of the necessary and periodical thinnings of the other occupants which have been planted as nurses or rather secondaries, and, after these are all cut out, a crop of valuable wood is left, which, although it may not arrive at maturity during the planter's life, greatly adds to the value of his property. But the Oak, though it requires a greater length of time to render it fit for naval and other purposes requiring a large scantling and sound heart-wood than our other forest-trees, is not of so slow a growth as many seem inclined to suppose, for it is found that its rate of increase, when planted in favourable soil and situation, and after it is once fairly established, is from one inch to one inch and three quarters in circumference annually, for nearly the first century, and that it has frequently been known to contain a ton of timber at the age of seventy; after this period, and until it attains its full maturity, or begins to decay, its annual increase in circumference is not so great, though its solid contents may be increasing faster, inasmuch as the square enlarges more rapidly by a smaller addition to the increasing diameter.

As compared with the larch, the Scotch fir, and others of the pine tribe, or with the rapid-growing poplars and willows, the growth of the Oak during youth is undoubtedly much slower, being only at one third the rate of that of the white poplar, and even less of that of the black Italian poplar; the difference, however, in respect to the ash, the elm, the beech, and some other forest-trees, is not nearly so great, as we find from Vancouver's observations in Hampshire that the relative increase of various trees in that county, taking them at ten years old, and fixing the Oak as a standard, was as follows; Oak ten, Elm sixteen, Ash eighteen, and Beech twenty. In our own plantations, which are of considerable extent, and upon which great care and attention has been bestowed in regard to timely thinning, &c., the difference in the rate of growth of the Oak, in respect to the ash, wych elm, sycamore, beech, &c., is not so great as above stated; indeed in some parts where the soil is particularly suitable to the Oak, now that the trees have attained the age of twenty-eight or thirty years, it is very trifling, and scarcely perceptible, and we find that at this age, in consequence of having planted the Oak in a larger proportion per acre than can stand permanently, the thinnings of this tree pay better than those of any other occupant except the larch, as they are of size sufficient to cut up into staves and other purposes to which the thinnings of the other kinds of hard wood at this age are applied, at the same time that the value of the bark, even at its present reduced price, more than repays the whole cost of cutting down and converting to use.

At twenty-eight years' growth we have several Oaks three feet in circumference at eighteen inches from the ground, a great number two feet four inches, and the

average of the remainder from sixteen to eighteen inches; within the same period, the growth of the larch, taking the medium size, is three feet nine inches at eighteen inches above the ground, the spruce fir nearly four feet, the Scotch fir three feet eight inches, the wych elm from two feet seven inches to three feet, the beech from two feet nine inches to three feet, the sycamore from two feet six inches to three feet, the black Italian poplar of twenty-two and twenty-four years old upwards of five feet, the *Salix alba* nearly the same.

Although the Oak will grow in a great variety of soils, and produces valuable timber upon such as seem of very opposite quality, it is generally acknowledged and allowed that it flourishes in the greatest perfection, and produces the best timber upon such as are of a strong adhesive nature, or are known under the term of clayey loams, or good clay soils, more particularly where the substratum is of this description, and of considerable depth, for as it sends down its roots much deeper than most other forest-trees, it derives its chief nutriment from the lower strata, and is not dependent as they are upon the nature of the surface soil. On this account we must not judge of the fitness of the soil for the growth of Oak, by the appearance or quality of the upper stratum, for it frequently happens that extensive districts, where the surface soil is of so poor and inferior a quality as scarcely to repay the cost of cultivation, are nevertheless, from their strong clayey substrata, well adapted to the growth of Oak: such is the case upon many moorish tracts and wastes, where a poor thin surface soil is succeeded by a deep stiff loam, or where the surface is of a poor tilly and gravelly nature, but with a strong clayey substratum. Upon the cold clayey tracts of the north of England and Scotland.

which unless subjected to the process of furrow draining, are scarce worth cultivating, the Oak grows vigorously, and with every promise of obtaining a valuable scantling; we have Oaks growing upon land of this description, which look as healthy and promise as fairly, as almost any we have planted upon what we consider the best of our woodland soil, and we can form some opinion of what the nature of the timber is likely to be when matured by age, from the quality and quantity of sound heart-wood the thinnings now show at the age of thirty years.

In preparing clay lands of this description for planting, the great object is to get them effectually surface-drained, so that after heavy drenching rains the superabundant moisture may be rapidly carried off, and not allowed to stagnate, and thus sour the ground, reducing it in wet seasons to the state of mortar, and afterwards leaving it, when desiccated by long-continued drought, as hard and impervious as a half-burnt brick. This must be effected by numerous open cuts, taking advantage of the hang or fall of the ground, and so disposed as to discharge their contents into one or more main drains, to carry the water entirely off; these open drains ought to be two spadings deep, about three feet wide at the top, and shelving gradually to the bottom, the cost of casting out which may amount to 2*d.* per rood.

We speak from experience of the advantage, indeed the necessity of effectually surface-draining land of this description previously to the insertion of the trees, for having planted about eight acres of a stiff clayey soil, with little fall but with no appearance of springs or bottom water, we found at the end of four years that the plants had scarcely made any progress, indeed that many had died, their roots having perished, either from the

constant saturation of the earth during long-continued rains, or else from having been desiccated and bound up in an impenetrable brick-like mass by the spring and summer droughts. In the autumn of the fifth year we had this plantation thoroughly intersected by open drains, and at the end of the succeeding summer the effect was visible and striking; the whole of the plants which, during the previous year, had presented a sickly, dying aspect, had already, in most instances, made tolerable shoots, and had acquired a healthy colour, at the same time that the soil had become loose and friable, and the surface which previously presented nothing to the eye but patches of *carex recurva*, and a few scattered tufts of *lotus corniculatus*, had become thickly covered with herbage. Up to the present time, now three years since the drains were cut, the progress of the trees has been as rapid as we could wish or expect, and the earth is now loose and friable, and of a texture very dissimilar to what it exhibited when saturated with moisture and undrained.

The Oak is propagated entirely by acorns, which are either sown at once in the place where the plants are to remain, or else in nurseries where, after being transplanted from the seed-beds, they are allowed to stand for two or three years, or until they acquire sufficient size and strength to suit the views of different purchasers. Each mode of propagation has its advocates and admirers, and much has been said and written by both parties in favour and defence of their respective opinions. The acorn planter pleads for his system that it appears to be more in accordance with the common course of nature, at the same time imagining that the preservation of the early tap root of the seedling is essential to the future developement of the tree; on the contrary, the favourer of the

plant system is satisfied that the cutting off the lower portion of the tap root at an early age, neither greatly retards the growth nor interferes in the slightest degree with the after developement of the plant, added to which he maintains this important consideration, that an Oak wood may be raised by the plant system at much less cost, and with greater certainty of success than by the former method.

After having made trial of both modes of propagation, and watched the progress of the Oak under each system for the last thirty years, we have no hesitation in giving a decided preference to plants over acorns, being convinced in planting upon an extensive scale, and where rapid growth and profit are the principal objects in view, that Oak woods may be raised by the plant system at less cost, and with a greater certainty of producing eventually, timber of as large a scantling and as excellent in quality, as by sowing the acorns where the trees are to stand.

The supposition that cutting off any portion of the tap root of the young Oak must be prejudicial to its growth, or that the tree continues to draw its chief support and nourishment during the many centuries it exists, through its medium, are both of them equally erroneous. It is a well-known fact that in seedling Oaks and other tap-rooted trees, the loss of the lower portion that may be cut off is soon supplied by the reproduction of one or more downward leading roots, as well as that the emission of the lateral roots which, after a limited time, or as soon as they have taken firm hold of the ground, undertake the duty of support, is thereby encouraged; and as Mr. Loudon observes, "it is also well-known that the tap root is only found in the Oak and

other trees when in a young state,* and that no Oak or other tree, when cut down or uprooted, was ever found to have anything like a perpendicular descending main root, in any way commensurate to the perpendicularly ascending trunk of the tree, above ground."

The tap root of the young Oak, like that of the walnut, and many other trees, only supports the plant during infancy, or for a limited time, which may vary according to the circumstances of soil, situation, and climate, but so soon as the lateral roots are emitted, and become large enough to undertake the support of the tree, from that time Mr. Davis, whose observations on this subject are well worth perusal,† remarks, " the tap root ceases to be useful and at no distant period ceases to increase, and is very soon not distinguishable from the other roots :" he afterwards arrives at the conclusion, " that not only will an Oak sapling or seedling from three to five years old, planted out with the tap root cut off, again root downwards, sometimes singly, sometimes forked," but that the practice of cutting off the tap root gives the plant new vigour, and enables it after a few years to exceed in growth the native tree, and further that large Oak trees, whether native or transplanted, long before they become fit for naval or other purposes, lose their tap roots altogether.

But, supposing the advantages, in respect to early growth, increased scantling, &c., of the two modes of propagation to be upon a par, or even somewhat in favour of the native plant, still we hold that in extensive planting operations,

* This is the case with several of the pine tribe, which when quite young have large tap roots, as any one may ascertain by examining seedlings of the pinaster, and stone-pines. These cease to elongate as soon as the lateral roots which, in most species run near the surface, acquire sufficient size to nourish the tree and have taken firm hold of the ground.

† " Bath Soc. Papers," vol. xv. p. 51.

more particularly in the north of England and Scotland, the cost of the acorn system would considerably exceed that where plants are used, and without ensuring the same certainty of success of a requisite number of trees; for, it must not be forgotten, that nearly the same labour and expence would be required to prepare the holes for the reception of the acorns, as would suffice to plant young trees by pitting, and much more, where this is effected by slitting in, a mode of planting that may be successfully used with small-sized plants, and which we would recommend where the soil is of a clayey retentive nature; but the expence of the acorn system does not end with the mere committal of the seed to the earth, the seedlings must be inspected and taken care of for two or three years afterwards, kept clean of weeds, and the supernumeraries thinned out, all of which operations are attended with considerable expence; added to this, it often happens that the greater part of the seed sown fails to vegetate, or is destroyed by vermin,* or other casualties, in which case, a similar expence for seed, planting, &c., must again be incurred, and, what is of still greater importance to the planter, the loss of the growth of several years. Acorns, also, it must be recollected, though frequently to be procured in plenty and at a cheap rate in many of the southern and midland counties, are costly in comparison when imported into the north of England and Scotland, and, as the crop is uncertain, they cannot be procured every season, whereas the nurseries are rarely without an abundant supply of young trees.

By the plant system, where common attention is paid to the operation, a regular crop of young trees, disposed at such distances as may suit the fancy and views of each

* See Billington's Planting, from page 37 to page 47.

respective planter, is at once secured, with the additional advantage of gaining from three to five years in advance of native plants, for, even should it be thought advantageous, as many do, to cut close over by the surface all such trees as at the end of the first or second season after insertion have made little or no progress, or which look stunted and unseemly in growth, still the shoot that they rarely fail to make after this operation, would, in almost every case, exceed the growth of a native plant of three or four years old, and the advantage would remain with the planted tree.

The benefit of trenching * and manuring the ground previously to planting has been much insisted on and strongly recommended in various treatises on arboriculture and planting; we think, however, that those who speak so highly in its favour and recommend its general adoption have been premature in their conclusions, and we fully agree in the opinion expressed by Mr. Matthew in his able treatise on naval timber, that, had they waited the result of twenty-eight or thirty years' growth, their conclusions as to its ultimate advantage would have been very different from those drawn from the state of plants, as exhibited in trenched ground, of eight or ten years' growth. Such also is the inference we draw from our own experience, and, as we have tested the system upon a tolerably extensive scale, and also watched its progress and effect in other instances, we venture to speak with some degree of confidence upon the subject.

About thirty years ago, an extent of about sixty acres around the mansion at Twizell was planted in one season, and, as a new approach was made to run through it, a strip of this ground, about thirty yards in width on each

* See Wither's Pamphlet.

side of the new road and nearly a quarter of a mile in length, was deeply trenched,* and a small portion manured in addition.

The rest of the ground, adjoining the strip on each side, was planted in the usual manner, either by pitting or slitting, as seemed to suit the nature of the soil, a large proportion being a strong loamy clay, the remainder of a lighter nature with a mixture of gravel. The trees planted consisted of Oak, beech, wych elm, sycamore, and larch, with a sprinkling of silver, spruce, and Scotch firs. Six years after planting, the trees in the trenched ground seemed fully established, having, from the second season after they were put in, made long and vigorous shoots, and had reached a considerable size, while those in the untrenched part seemed at that age to be only recovering from the effects of transplantation, or just beginning to push freely away; at twelve years old, the plants in the trenched ground still continued to grow rapidly and luxuriantly, and were far ahead of their neighbours, but the latter had now begun to push vigorously, and to make strong and lengthy shoots; at fifteen or sixteen, the shoots of the trees in the trenched parts began visibly to decrease in length and vigour, in consequence, we may suppose, of the rapid exhaustion of the trenched soil, and the descent of the roots to the unmoved stratum below, which gave, as it appeared, a sudden check to their previously rampant growth; no check of this kind took place with the other trees, as they continued to advance steadily and rapidly every season; at the end of twenty years, though the trees in the trenched parts continued healthy, the annual growth of those in the untrenched ground had, for the last four or five years, exceeded theirs, and

* The cost of trenching at that period was 10*l.* per acre.

the difference in height and size, so marked at an earlier period, was now rapidly decreasing, and in the course of four or five years more, was not observable; since then, or up to the present time, an interval of four years, their respective progress has been nearly on a par, though we think we can discern a slight advantage in favour of those in the untrenched ground; so that, from this experiment, it would appear that in less than thirty years, all apparent advantages from trenching had disappeared, and, we may add, that, in various other instances, where we have been enabled to institute a comparison between the growth of plantations on trenched and untrenched ground, the result has invariably been the same, nor have we been able to discover any marked distinction even where high manuring has been added to the trenching, its effects appearing to be merely temporary, and not of permanent advantage to the tree.

But, even allowing all the advantages as to rapid growth, &c., attributed to trenching by its advocates and admirers, to be true, the cost alone attending the operation must always prevent its adoption upon an extended scale, and, where profit is looked to, it is entirely out of the question, as we feel assured that no growth, however extraordinary, would ever repay the enormous expence incurred in raising timber upon this system, without taking into consideration that a vast proportion of land, well adapted for planting and the growth of timber, could not possibly, from the nature of its surface, be subjected to this operation. Trenching, therefore, may be considered not only an expensive and unprofitable preparation for growing timber, but as money thrown away, inasmuch as it is attended by no beneficial result, neither accelerating maturity, nor adding to the value and quality of the timber when matured.

In forming mixed plantations, where the Oak is introduced, and where it is intended to stand for timber after the other occupants have been removed or thinned out, great attention is necessary in selecting the kinds best adapted for nurses, or as intermediate occupants, and at the same time suited to the soil upon which the plantation is meant to be raised.

In the north of England and in Scotland, where, within the last forty or fifty years, a large extent of surface has been appropriated to the raising of timber, a great error has very generally been committed, in introducing, in too large a proportion, the wych elm, the ash, and the beech, with the oak, as the habit and growth of these species render them peculiarly inimical to the progress of this tree, which bears interference with less patience, and suffers more from close contact, than almost any other; the first, indeed, we think, ought to be almost entirely excluded* from mixed plantations, as it is certain, from its rampant growth for the first few years after being planted, from its wide-spreading head, and the fanlike form of its branches, to overtop, lash, and injure every other species around it, add to which, that it is only upon land of superior quality that it attains a large and valuable size, as it almost invariably becomes stunted and unhealthy upon clayey soils, however rapidly it may grow for the first eight or ten years, during which period it seldom fails to do serious injury to its neighbours, and particularly to the slower-growing Oak.

The ash, also, when it attains a considerable height, becomes a most injurious neighbour to the Oak, for, being drawn up with a long straight stem, of nearly the same diameter throughout the greater part of its length, and

* In low and rich bottom ground it might perhaps be planted with the ash.

terminating in a spreading heavy head, it is easily swayed by the wind, and, from the formidable nature of its strong unbending spray, is certain to do serious injury to every tree that stands within its sweep. The beech, also, from its wide-spreading head, is unfit to plant with the Oak, added to which, its timber when young is of very trifling value.

Trees of a pyramidal growth are those best adapted to plant with the Oak, as they do not interfere with the head growth of this important tree; it is therefore that the larch, the Scotch and the spruce fir are so well suited to act as nurses or secondaries to the Oak, their rapid growth affording a kindly warmth and shelter, at the same time that sufficient head room is allowed to the trees they are meant to foster and protect.

Of the deciduous or hard-wood trees best suited to mix with the Oak, we consider the wild cherry or gean, the sycamore, and the birch as holding the most prominent station, the two first from their pyramidal form during the first twenty or thirty years of their growth, their stiff unbending spray, not easily moved or swayed by the wind; the birch, from its upright and fastigiate growth and its very slender spray, which, though liable to be moved, is of too delicate a texture to injure the more robust and thicker shoots of the Oak. The sweet chesnut, also, and the Cerris Oak may be profitably introduced in suitable soils, as neither of these trees, from their habit, are likely to be injurious to the Oak, and as their timber becomes very valuable at the age of thirty or forty years they are well calculated for secondaries or intermediate occupants. The larch, however, in all districts where it will grow is the tree we would recommend to be planted in the largest proportion with the Oak, being, even as

a mere nurse plant, superior to any of the other firs, as, at the same time that it affords sufficient shelter, it admits, from the nature as well as the deciduous character of its foliage, more light and air at all seasons than they do; it also occupies less room, grows as rapidly, and its thinnings are valuable, even from the size of a hedge stake.

We shall now proceed to make a few observations upon the combinations, or assortment of trees we think best adapted to plant with the Oak, upon soils of various qualities, taking climate and situation also into consideration. Upon land of good quality and loamy nature and tolerably sheltered the following combinations are recommended, and, taking the number of trees to be planted upon each acre at 3000, that is, at rather more than three feet and a half apart, they may be proportioned as follows: first combination, larch 1000, firs Scotch and spruce 400, the spruce for the damper spots, and where the surface soil is light, Oak 600, cherry 600, sycamore 400; a second combination might consist of larch 1200, Oak 600, cherry 300, sweet chesnut 300, Cerris Oak 200, firs 400; a third combination, larch 1500, Oak 600, sweet chesnut and Cerris Oak 400, cherry 250, sycamore or birch 250. Should the 3000 trees per acre, upon this superior soil, be thought too great a number, then the different species may be reduced proportionately to the numbers above given.

On soils of a stiffer or clayey staple, and in upland or more exposed districts, the combination might be first, larch 1000, firs 500, Oak 500, cherry 200, Cerris Oak, chesnut, or sycamore 300, birch 500; or, second combination, larch 1000, firs 600, Oak 600, cherry 300, sycamore and birch 500. In exposed and open districts, where the surface soil is thin and poor, but where the substratum

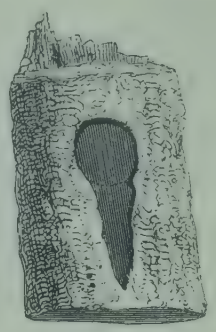
is of a strong argillaceous nature and capable of bearing Oak, the following combination may be adopted, larch 1200, firs 600, Oak 600, birch 600; or, second combination, larch 1200, firs 800, Oak 400, birch 600.

The Oak is generally planted by the pitting method, and the pits should be made two or three months before the plants are put in, in order that the earth thrown out may become loose and friable by exposure to the atmospheric air; this is certainly the best method upon all soils where superabundant moisture can readily escape, as plants of a larger size can be used, and sufficient room given to the large and lengthy tap root, without cutting off so large a portion of the lower part of it as is frequently done by ignorant workmen to facilitate its insertion in the ground. In stiff retentive clays, however, we prefer the slitting system, using plants of rather smaller size; the great advantage attending this mode of planting is, that no reservoir is formed for any quantity of water to stagnate around, and corrupt the roots, which frequently happens where pitting has been pursued upon stiff retentive soils.

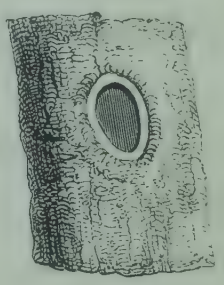
Two years after planting, the Oaks should be carefully inspected, and every plant that seems stunted or of unseemly figure, cut over close by the ground; this operation gives an immediate stimulus to the root below, and it rarely fails to throw up a strong straight shoot, in most instances taller than the original stock that had been cut away. Subsequently the Oak requires very little pruning, and the knife ought rarely to be used except to remove a supernumerary leader, or to shorten a side branch of too rampant a growth, and this ought only to be done whilst the tree is young, and always in summer, or after the expansion of the leaves.

The excision of large branches of the Oak close by

the stem we have always found attended by injurious effects, but to a much greater extent when performed during the dormant or winter season than when the tree was in leaf, and its vitality in full action. If performed during the first-named period, in addition to a rapid taint or incipient decay of the surface of the wound, we have generally observed that the bark at its lower angle lost its vitality and began to decay, thus enlarging the wound to a considerable extent downwards, as shown in the figure, and exposing in addition to the space occupied by the branch, a large surface of the stem to the action of the air and moisture.



This, however, rarely takes place in a healthy tree when the branch is taken off during summer, or immediately after the tree has expanded its leaves, for its vital functions are then in full activity, and it has already begun to elaborate and deposit its layer of alburnum or young wood which immediately begins to form around the edges of the wound as shown in the figure, (where the white ring represents the recently-deposited wood,) and, continuing to advance upon it, has generally by the end of summer so far covered it as to protect the lower angle from the effects of cold and moisture.



But the Oak in mixed plantations, or grown in mass, does not require the artificial pruning that Pontey and others have advocated, to give it length and cleanness of stem, to qualify it when mature for plank timber; in such situations it must necessarily make every effort to keep pace with the growth of the other trees around to

secure its portion of light and air; its growth is therefore for many years principally confined to the elongation of the trunk or main stem; this, together with the confined space to which it is restricted, prevents the vigorous growth and great enlargement of the lateral branches, which always takes place in single trees, or where they have space and air. Indeed the difficulty is to induce the Oak in plantations to retain lateral branches sufficient to maintain and support it in vigorous health, and this can only be effected by oft-repeated thinnings to admit of sufficient light and air, and prevent too close an interference of other trees with its growth and head room; for how often do mixed plantations meet the eye wherein the unfortunate Oaks, from want of air and timely thinning, are drawn up to long consumptive-looking poles, entirely divested of their lateral branches, or as it were deprived of a portion of their lungs, and barely kept in a lingering state of existence by the few top-most shoots, that in the struggle for life have forced their way to the light.

At Twizell, where thinning has been freely administered and carefully attended to, the Oaks in plantations of about thirty years old have run up with fine straight stems, many of them full thirty feet in length, and still carrying an upright leader. All these, however, still retain a portion of their lateral branches, which assist so essentially in the important functions of conducting and elaborating the sap, and without which the deposition of the woody fibre cannot be effected to the extent necessary to the health and vigour of the tree; these laterals, we expect, will retain their vitality so long as the trees require and are benefited by their presence, their removal or decay only taking place gradually, or as the upper branches

which are to form the future head of the tree become enlarged, and are able to take upon themselves the entire support of the lower portion of their trunks.

Upon single trees, or where the Oak stands free and unencumbered, the pruning knife must be used with the greatest caution, and only at an early stage of growth, when it may be necessary to remove a second leader, or to curtail a side branch that threatens to interfere with the form and destroy the balance of the plant; for being naturally a wide-spreading tree, the lopping of the side branches in order to give length of stem, as directed and recommended by some writers, is certain not only to destroy its characteristic beauty and grandeur of form, but to prove most injurious to its growth, as the tree is thereby deprived of those very members upon which its health and vigour mainly depend, not to mention the risk of producing early decay by taint received through the medium of the wounds caused by the excision of the branches.

Timber for naval purposes, we must also bear in mind, is not confined to planking, or that portion of the tree produced by a long straight trunk; the knees and bends formed by the angles the side branches and limbs make with the main stem of the tree, are also of paramount importance in naval architecture, and these are always procured in the greatest perfection from trees that have grown in their natural and expansive form, and hence it is that hedge-row Oak in general affords so large a supply of this valuable denomination of timber.

By some of our arboricultural authors, hints have been thrown out and schemes proposed to obtain by artificial means the various bends and angles required in ship-timber; but however ingenious some of these plans may

be, we do not think the system can be profitably pursued upon an extensive scale; besides, it is now the less necessary, as by the application of steam and mechanical means, timber can be bent and brought to almost any form required. Among the various devices proposed, we think those of Mr. Matthew best calculated to produce the effect intended, and to his observations on this subject contained in his able treatise on naval timber, &c., we refer our readers.

In some parts of Scotland, and particularly in the highland districts, as well as in the west and north of England, Oak coppice wood prevails to a considerable extent; this copse is the produce of the old stocks or stoves of former Oak trees, or of such as have been planted for the express purpose, and is cut over at various periods between the ages of fifteen and thirty years, or according to the rapidity of its growth, which depends greatly upon soil and climate, as the shoots which, in the south of England, and upon good soil attain a diameter of from four to six inches in fifteen years, would, in the colder climate of Scotland require twenty-five years or more to reach the same dimensions.

To the system of Oak coppice wood we are decidedly opposed, and we most cordially agree in Mr. Matthew's recommendation to the holders of such property, that "they should immediately set about converting their coppice hags into Oak forest, either by careful thinning and selection," or by rooting out the old stoves, and replanting the ground with Oak and other trees: no diminution or loss of income, we are confident, would follow such a change; on the contrary, we believe that the return from such woods thus replanted, would be greater even within the first thirty years of their growth than can now be realized

from coppice, to say nothing of the constantly increasing return they would make after this period for a long series of years, or of the value of the crop of Oak that might eventually be left to reach maturity or a scantling fit for naval and building purposes.

The principal inducement that some years ago existed, to retain and cultivate copse wood Oak, is now greatly diminished, for the bark, which constitutes the chief value of coppice, as may be collected from the statements of the author of the "Forester's Guide," the great advocate of this system, which, during the war period, produced upwards of fourteen pounds per ton, having now fallen to less than half that price, the wood is, from its small size, of little importance and value, and the greater part cut in Scotland is either cut up into spokes for carriage wheels, converted into charcoal, or distilled for the pyroligneous acid it contains, which latter product is extensively used in calico printing and bleaching operations.

To procure the valuable bark of the Oak* the operation of felling must be performed in the spring, when the sap is sufficiently up to allow of its being easily stripped from the tree; by some it has been supposed that cutting at this season must be injurious to the timber, but this, from the observations and experiments that have been made, does not appear to be the case, and it is found that the heart-wood of Oak cut down in the full run of the sap, is equally as durable as that felled in winter, or in the decline of the year, as well as of trees that have been barked and allowed to stand a year or two in that state previously to being cut down.

In all cases the white or sap wood of Oak is equally

* The bark alone of the great Gelonos Oak, felled in Monmouthshire in 1810, is said to have sold for 200*l.*; this tree eventually produced 675*l.*

liable to perish and moulder away when exposed to the alternation of dryness and moisture, and no treatment has hitherto been discovered* (unless Kyan's solution should prove to be so) to render it as durable as the deeper-coloured heart-wood.

In respect to the age at which the Oak ought to be felled, to produce the greatest profit, that must in a great measure depend upon soil and climate, as well as upon the demand for Oak timber of this or that description and quality in each respective neighbourhood; it may, however, Loudon observes, be taken as a rule, that whenever a tree has reached that period of its growth, that the annual increase does not amount in value to the interest of the money which, at the time, the tree would produce if felled, then is the most profitable time to take it down. For ship timber, Oak of ninety years growth, in the most favourable situations as to soil, &c., such as the weald of Kent, is considered by Mr. Larkin,† an eminent purveyor of naval timber, as the most profitable age for cutting, for although larger scantlings are produced at one hundred and thirty years growth, the increase in the forty additional years will scarcely pay two per cent.

As a hedge-row tree, the Oak is generally allowed to be superior to any other, producing, in this situation, not only the most valuable timber and the thickest bark, but interfering less, from the downward direction of its roots, with the tillage of the ground in its immediate vicinity; its shade and drip also are less injurious to the undergrowth

* We have since been informed that, in Gloucestershire, white or sapwood Oak is rendered durable by immersion in water for six or eight months, previously to its being cut up for use.

† "Gardener's Mag." vol. xi. p. 690.

beneath, than that of any other tree except, as Mr. Matthew observes, the apple and the pear. It is also, in an ornamental point of view, one of the most desirable, from the effect its form and varied outline, as well as its rich and clustering foliage, produce in the general scenery of a cultivated district.

It may perhaps be objected to the planting of the Oak as a hedgerow tree, that its success, at an early age, is less certain than that of some other trees; this, however, we believe, more frequently results from a want of attention to the proper selection and management of the plants, than to any peculiar delicacy or aversion of the Oak to transplantation. We have succeeded in transplanting the Oak of considerable size, and with as great a certainty of success as any other tree, but, in all cases, care was taken to select plants of sturdy growth, to prepare the ground previously to their reception, and, what is of vital importance, effectually to protect them from injury, and the depredations of cattle, sheep, &c.

Mr. Matthew, also, strongly advocates planting the Oak in hedgerows, and gives some excellent directions to ensure success; in speaking of the size of plants best adapted for this purpose, he recommends those of eight or twelve feet high, and which have been reared in exposed situations, and, he remarks, "we have experienced better success with hardy plants from the exposed side of a hill, having unfibred carrot roots much injured by removal, than with others from a sheltered morass, having the most numerously fibred and well extracted roots." We shall now succinctly advert to the Oak in its ornamental capacity, or its use and importance in landscape scenery, for, independently of those feelings and associations naturally attached to a tree that has so essentially contributed to the glory

and welfare of our sea-girt land, it possesses all those characteristics which are considered necessary to give it that value and peculiar effect which alone can satisfy the eye of the painter or the lover of the picturesque. Gilpin, whose taste for natural beauties no one will impugn, after quoting Virgil's graphic description of the Oak, commencing,

Esculus imprimis, &c.

and dwelling upon its massive and well-balanced trunk, characteristic of its firmness and strength, the stoutness of its limbs, appearing, as it were, to be portions of the stem itself, rather than to spring from it like those of most other trees, its twisted and contorted branches, "which like a river sport and play in every direction, sometimes in long reaches and sometimes in shorter elbows," its expansive spread, and its longevity, thus concludes his observations, "I have dwelt the longer on the Oak, as it is confessedly both the most picturesque tree in itself, and the most accommodating in composition. It refuses no subject, either in natural or artificial landscape; it is suited to the grandest, and may with propriety be introduced into the most pastoral. It adds new dignity to the ruined tower and the gothic arch; by stretching its wild moss-grown branches athwart their ivied walls, it gives them a kind of majesty coeval with itself; at the same time, its propriety is still preserved if it throws its arms over the purling brook or the mantling pool, where it beholds

'Its reverend image in the expanse below.'"

Mr Strutt, also, whose delineations of British trees and forest scenery stand unrivalled for their truth, beauty, and artist-like effect, in some valuable remarks on the

picturesque beauty of the Oak, contained in the "Mag. of Nat. Hist.," after pointing to the division of the European trees into four forms or classes, viz., the round, the spiry, the shaggy, and the slender topped, thus speaks of the Oak. "In the first of these classes, (the round topped,) foremost in dignity and grandeur, the Oak stands preeminent, and, like the lion among beasts, is the undoubted lord of the forest. Beauty, united with strength, characterizes all its parts. The leaves, elegant in their outline, are strongly ribbed and firmly attached to the spray, which, although thin and excursive, is yet bold and determined in its angles, whilst the abrupt and tortuous irregularity of its massive branches admirably contrasts with the general richness and density of its clustered foliage."

The horizontal direction of the branches, their strong, tortuous, and sinewy aspect, the angular interwoven nature of the spray, are all suited to the pencil, and give to the Oak, even in its denuded state, a richness of appearance possessed by no other tree. Its foliage, also, is such as a painter likes to delineate, being richly tufted and clustered together, forming those masses which produce the finest effect of light and shade, and its colour is warm, rich, and pleasing, from the period that the leaves first burst their cerements to the rich russet tints they acquire previously to their fall in autumn. The tufting of the foliage, we may remark, is much more conspicuous in the peduncled Oak, than in the sessile-fruited variety, and on this account the former surpasses its rival in picturesque effect, for, as the Rev. W. T. Bree observes, "the leaves of the *Quer. pedunculata*, though rather small, are very numerous and grow close to the spray, clustered in those dense masses which constitute one of the charac

teristic beauties of the Oak," whereas those of *Quer. sessiliflora*, though larger in size, are less thickly set, and, from the length of the petioles, hang loose and straggling, and give to the general aspect of the foliage that want of depth and solidity possessed by the other. In legendary history the Oak appears to have been invested with a sacred character, and to have been the symbol under which the gods of the Celts and ancient Britons were worshipped, for under this form divine honours were paid by the Celts to their god *Teut*, and by the Britons to *Tarnawa*, their god of thunder. The rites of Druidism were many of them performed under the shade of the Oak, and the misseltoe, when found growing upon it, was held in peculiar veneration. It was from the traditionary recollection of the sacred character of the Oak, even after Druidical worship was abolished, that its wood was always appropriated to the most memorable uses, and it is to ceremonies connected with that worship that the origin of the yule log is dated, with which the Christmas fire, even to the present day, is still lighted in this and some other districts of the kingdom.

In concluding the history of the Oak, we must not omit the extraordinary number of insects that are wholly or partially supported by it, amounting, it is supposed, to nearly two thousand species, fifteen hundred of which may be considered to be phytophagous, or actual feeders upon some portion of the tree, the remainder as parasites attached to these, and belonging to the ichneumonidæ, and other parasitic tribes. To enumerate even a tenth of these inhabitants of the Oak would occupy greater space than we can afford; we must, therefore, restrict our remarks to a few of the most remarkable species belonging to the various orders, and this we do with the less com-

punction for the omission of the rest, as Mr. Westwood has already, in the "Arboretum Britannicum," given an extensive list and interesting account of the Oak-feeding insects. Of those which feed upon the wood chiefly in the larva state, are the caterpillars of the goat moth *(Cossus ligniperda)*, and wood-leopard moth *(Zeuzera æsculi)*, also the grubs of several of the capricorn beetles, among which are *Prionus coriarius* and *Clytus arcuatus*. The *Elater sanguineus*, both in the larva and perfect state, is found in rotten Oak stumps, and the grub of the great stagbeetle, *Lucanus cervus*, is a consumer of the like matter. *Trichius variabilis*, a very rare British insect, occasionally met with in the New Forest, is also an Oakwood eater, as well as several species of *Lymexylon*, which are particularly destructive to Oak timber. Amongst the leaf-feeding species a long list belongs to the lepidopterous order, though the caterpillar of the purple hair-streak *(Thecla quercus)*, is the only one belonging to the butterflies. Of the Sphingidæ, the caterpillar of the beautiful lime hawk moth *(Smerinthus tiliæ)*, is occasionally found upon the Oak, and amongst the Bombyces there are many which feed upon it exclusively, such as the different species of *Chaonia*, *Perridea serrata*, *&c.*, and others only occasionally, as *Lasiocampa quercus*, and *roboris*, *Saturnia pavonia*, and *Tau*, *Pygæra bucephala*, *&c.* Several of the Lithosiidæ are also Oak leaf-eaters, and amongst the numerous Noctuidæ are several species of *Orthosia*, *Glæa*, *Xylina*, and *Xanthia*, also the beautiful *Miselia aprilina*, *Merveil du jour*, the caterpillar, pupa, and imago of which are represented at page 288. Three species of *Catocala* are exclusively Oak-feeders, and another, *Catocala fraxini*, one of the finest of the genus, is occasionally found upon it. Of the Geometridæ, Platypterycidæ, Pyralidæ, Tortricidæ, and

remaining groups of the Lepidoptera there are a vast number of Oak-eating species; we must, however, limit our notice to one whose devastations are sometimes so extensive as completely to denude Oak woods of their foliage throughout entire districts: this is the work of the leaf-rolling caterpillar of the pretty little green-coloured moth, the *Tortrix viridana*, which, in some years, appears in countless myriads. Providentially, these visitations rarely, if ever, continue for more than two seasons successively, otherwise the trees would inevitably perish from the renewed deprivation of their leaves, members so essential to their very existence. How the sudden diminution is effected we can only guess at, but, in all probability it is by that beautiful ordination of providence, where a corresponding increase of those parasitic and other enemies takes place of which it is the accustomed and peculiar prey.

Several coleopterous insects in the perfect state also feed upon the leaves of the Oak; among them is the well-known cockchafer *(Melolontha vulgaris)*, the *Orchestes quercus*, or Oak flea, the *Cryptorynchus quercus*, *Agrilus viridis*, *&c.* They are also infested by a species of *Psylla*, by *Aphis roboris*, and *A. quercus*, *Coccus quercus*, *&c.*, and we may here state our belief, deduced from long observation, that the honey dew upon the Oak is invariably the produce of these insects, as we have never been able to trace its presence, except where some of the species were to be detected upon the tree.

Of the various galls or Oak apples, the nidi of different species of cynips, produced by the puncture of the ovipositor of the female upon the different parts where they are found, we shall only mention that, in regard to those beautiful little excrescences so common upon the under side of the leaves of the oak and known by the name

of spangles, we, several years ago, ascertained that they were the nidi of a cynips, having reared a great many of the perfect insects from the spangles collected in the autumn, and kept in a cool and rather moist atmosphere during the winter. About the fall of the leaf, these spangles begin to lose their flat mushroom-like form and red hirsute appearance, and become by degrees raised or bossed towards the middle, in consequence of the growth of the enclosed grub, which now becomes visible when the spangle is cut open. The perfect insect makes its appearance in April and May.

The species of lichens, fungi, and mosses which grow upon the Oak are also very numerous, but, as our description has already exceeded its due limits, we must refer our readers to cryptogamic authors and to the list of these plants contained in the "Arboretum Britannicum."

Quercus Cerris. LINN.

TURKEY, OR MOSSY-CUPPED OAK.

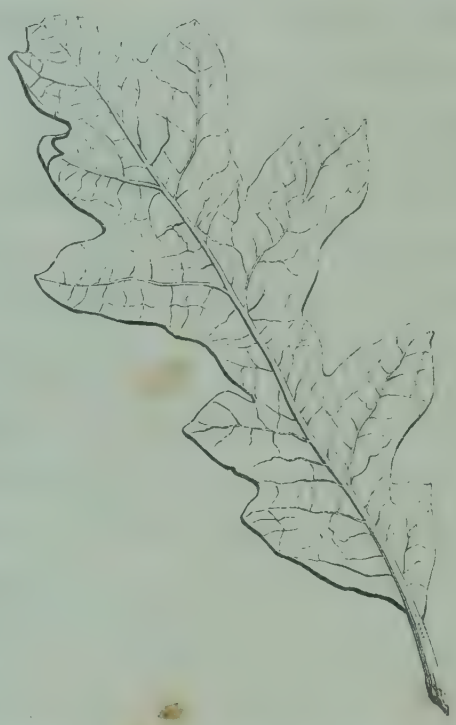
Quercus Cerris,

LINN. sp. pl. 1415.
WILLD. No. 75.
LOUDON's Arb. Brit. p. III. ch. cv. p. 1846.

THE Turkey Oak is specifically distinguished by oblong, deeply-lobed, and sinuated leaves, with short petioles and hairy beneath, the lobes lanceolate, acute, and somewhat angular. The buds surrounded with long linear stipules

which spring from around their axils. The calyx or acorn cup echinate, or armed with bristly scales.

A century, it appears, has now elapsed since the first introduction of the Turkey Oak into Britain, and though it grows with great rapidity and vigour, bearing, with perfect impunity, our severest seasons, and thriving upon soils of middling and even inferior quality, it has not hitherto met with that encouragement it appears to deserve both as an ornamental addition to our sylva, and as a useful and profitable timber tree. It is from a conviction of its importance in the latter point of view, and supported by the high opinion such writers as Matthew, Bosc, &c., entertain of its valuable qualities, that we admit it into the present work, being anxious, if possible, to bring it into more general cultivation, and to see it take the place of some other trees of less merit in our mixed plantations, particularly in those where the British Oak is intended to form the final crop. Thus, instead of the Wych elm, the beech, and in most cases the ash, which, for the last forty or fifty years, have been planted with too liberal a hand in



most of our plantations, and all of which, from their habit and mode of growth, are inimical to the progress of the Oak, we would recommend, in their stead, the free admission of this tree, as it is not only a less injurious neighbour to its congener, but grows as rapidly, perhaps even more so than any of those above-mentioned, and would, within the first thirty years, return as great a profit by its thinnings, which make excellent barrel staves, and are applicable to various other purposes; when large, or at its prime, which is at seventy or eighty years of age, it would produce a wainscot for cabinet and other internal work, superior in beauty and appearance to that of the common Oak, and, if kept dry, equally as durable.

It may, perhaps, be objected to such an extensive cultivation of the *Cerris*, that plants could not at present be procured from the nurseries in sufficient numbers, or that their cost would not permit of their being used to the same extent as the Wych elm, ash, &c. To this we answer, that there is little doubt but that the supply would increase with the demand, and that means would be taken by the nurserymen to procure whatever seed might be required, if not at home, at least from the Continent, where the tree abounds, and that an extensive sale and steady demand would soon reduce the price of plants to a rate that would allow them to be introduced in any proportion required.

The Turkey Oak, in its mode of growth, differs greatly from the British species, for, even as a single tree, it generally shoots up to a great height, with a straight continuous trunk to which the branches are subordinate, rarely divaricating, or throwing out such huge limbs as the common Oak.

The branches, also, which are remarkable for their ex-

pansion, or gibbosity at their junction with the trunk, generally at first take a more upright direction than those of the common Oak, and, from the position of the buds and mode of growth, are at all ages destitute of that angular and tortuous appearance which characterizes the branches and spray of the common Oak: it therefore usually retains a pyramidal form, and on this account is better adapted, and a more appropriate tree to plant with the common Oak than those we have already alluded to.

The leaves, which are generally persistent in a withered state during winter upon young trees under fifteen or twenty years old, vary greatly in form upon different individuals; they also vary considerably in their colour, in the common or typical shape, being of a fine bright shining green above, and slightly glaucous beneath, in others of a deep green and still more glaucous on the under surface, frequently also approaching in form to those of the hybrid sub-evergreen varieties, *Quer. c. Fulhamensis* and *Quer. c. Lucombiensis.*

The foliage is usually abundant and in fine tufted masses, and the contrast of colour of the two sides of the leaves often produces a sparkling and brilliant effect; this, together with the large size it attains, and its well-balanced form, renders it a very handsome and ornamental tree, though it can never boast of the picturesque appearance possessed by the British species. It grows rapidly, and with great vigour, even in soils of inferior quality, and is found to thrive upon those of a sandy, as well as those of a clayey nature, and even where the latter has been of a cold retentive quality we have noticed it making a progress beyond that of any hard wood tree planted in its company. Upon good wood land, or soil adapted for the Oak, it frequently makes a leading annual shoot

during the first twenty years of its growth of more than two feet, and at Twizell we have young trees which, at eighteen and twenty years old, have attained a height of thirty and thirty-five feet, and a circumference of two feet six inches at one foot from the ground. At Stanwick, Yorkshire, the seat of Lord Prudhoe, there is a beautiful *Cerris* which measures upwards of eleven feet in circumference. As might be expected, from its more rapid growth, the duration of the *Cerris* falls far short of that of the Oak, and it is accounted to be at its prime, or at the fittest age for felling, when sixty or seventy years old. After this period the timber is apt to get shaky, and then begins to decay at the heart.

Hitherto the quality of the British grown *Cerris* has been but seldom tested, few trees having yet attained sufficient age or dimensions for felling. We have, however, an account of two cut down at East Hampstead, in Berkshire, a seat belonging to the Marquis of Downshire, the wood of which was made into doors for some of the principal apartments. Mr. Atkinson,* who gives the account, pronounces the grain to be much finer than that of British Oak, also that it takes a better polish, and is more beautiful than any other Oak wood he had ever seen; the same gentleman, in testing its properties with those of the common Oak, found, that though not quite so strong, it was as tough as native Oak, although the specimen submitted to trial was not of the best quality, but rather cross-grained; and he adds, "for all ornamental purposes where the wood has to be polished it is superior, and must be a profitable tree to plant, as it grows much quicker than our common Oak, and I have seen it thrive rapidly in poor land."

* "Hort. Trans." second series, vol. i. p. 338.

From further information obtained by Mr. Loudon from the Marquis of Downshire, its inferiority to the Oak is principally observed in its greater liability to decay when exposed to weather, or in situations where it is alternately wet and dry; in all others, it is considered scarcely inferior to the wood of English Oak. Upon the Continent it would appear to attain a still greater degree of perfection, as we learn from Bosc and other writers that the wood is good for all purposes, and that in the south of France it is even preferred to any other for ship-building. At Constantinople, also, it is used for naval timber, as well as for the frame-work of houses. This use of the *Cerris* timber, in situations where it must be exposed to the vicissitudes of weather, would imply that, grown in a warmer climate, it brings its wood to greater perfection, and endued with superior protecting qualities than it possesses when reared in a higher latitude; and this agrees with the statement, that the wood of the *Cerris* in the south of France is much harder and more durable than that produced in the northern parts of the same kingdom.

But inferior as the *Cerris* timber grown in England may be in some respects to the British Oak, it is still well worth cultivating for the beauty and excellence of the wainscot it produces, as well as for other purposes to which it is applicable, as staves, joists, beams, &c.; added to which its rapid growth ensures an early profit, at the same time that the beauty of its form and foliage greatly contributes to the decoration and effect of our landscape scenery.

The *Cerris* is a native of the middle and southern parts of Europe, and also extends its range to a portion of Western Asia, being indigenous throughout the greater

part of Asia Minor and Syria. The species is propagated by the acorns, which are borne in abundance after the tree has attained a certain age, and are frequently ripened even in the north of England. The varieties, however, which are numerous, must, in order to prevent further sporting, be continued by grafting, which is done by the slip method upon stocks of the species, or those of the common Oak, and the closer to the ground the graft can be placed upon the stock the better, as it succeeds much more readily when the earth can be heaped around it, so as to leave not more than a single eye or bud exposed.

Plants raised from the seed succeed best if twice transplanted during their stay in the nursery before they are finally removed, as their lengthy tap root generally having a portion cut off in the operation, throws out a greater abundance of lateral roots, a circumstance greatly in favour of their success. The pitting mode of planting must be pursued, as the length and size of the roots prevent their easy insertion by the T or slitting method.

Amongst the varieties of the *Cerris*, the *Quer. c. pendula*, weeping Turkey Oak, seems one of the most beautiful and best deserving of culture; a fine specimen of this variety, now forty years old, growing at Hackwood Park, is figured in Loudon's "Arb. Brit." The *Quer. c. Austriaca* is another well-marked variety, and a native of Austria, Hungary, and other parts of Europe, and to this *Quer. c. cana major* and *minor* seem nearly allied. But the finest and most desirable varieties, in an ornamental point of view, are those sub-evergreen kinds known by the names of the Fulham and Lucombe Oaks. Of the origin and age of the first nothing precise seems known, except that it is supposed to have been raised at Fulham, from seed. It is a fine, broad-leaved, sub-evergreen variety,

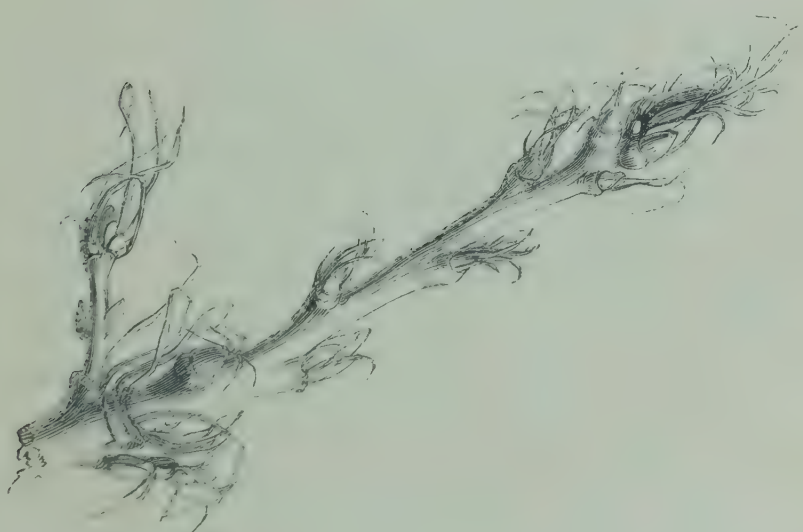
with a large branching and rounded head, and a bark slightly corky or rough. The original tree, at the time the "Arboretum Britannicum" was published, measured seventy-five feet in height, with a trunk three feet ten inches in diameter at three feet from the ground, the branches covering a space of fifty-four feet in diameter. In favourable seasons this tree produces abundance of acorns, from which many plants have been raised; these, as might be expected, produce a progeny varying greatly in the form of their leaves, but most of them retain their evergreen character in a greater or less degree.

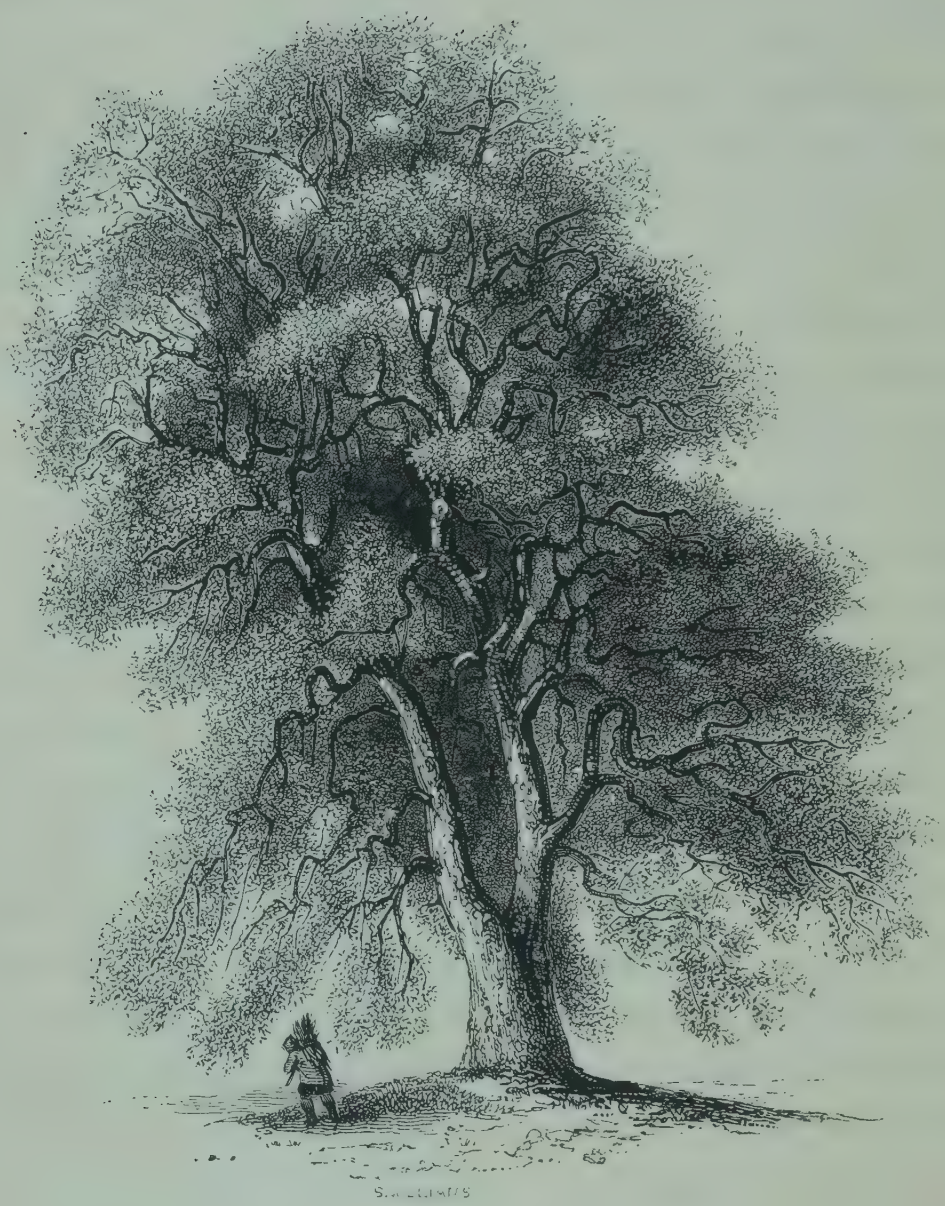
The Lucombe, or Exeter Oak, is also a sub-evergreen, and was raised by Mr. Lucombe, a nurseryman at Exeter, about 1762, from acorns of the common *Cerris*, which grew in the nursery, and near to a specimen of *Quer. suber.* (cork tree), by whose farina it is supposed the blossom of the *Cerris* Oak was impregnated.

However closely in form the leaves of the Fulham and Lucombe Oaks resemble each other, these trees, in their habit of growth, are very dissimilar, as the Lucombe instead of the round-headed form of the Fulham variety, always presents a fine pyramidal outline, and the bark is also much rougher and more corky, showing its nearer relationship to the *Quer. suber.* It grows freely and with great rapidity, and in some instances has attained a height of upwards of eighty feet in seventy years. To perpetuate the original variety, it must be grafted upon the common cerris, for although it ripens acorns in abundance, these being the produce of a hybrid cannot be depended on as certain to come true to their parent. Several fine varieties, however, have been raised from its acorns, some of which show a still nearer approach to *Quer. suber.* than the parent tree, the bark being still more corky, and the evergreen

character more permanent. Others again revert to the female parent of the Lucombe, and assume the character of the common *Cerris*. The original tree reared by Lucombe, after he had propagated from it extensively, was cut down at the age of twenty years with the intention of having his coffin made out of it. Loudon adds, that he lived so much longer than he anticipated, that several years before his death he had a much larger and older tree cut down, sawn into plank, and carefully deposited under his bed, in readiness for the above purpose.

The wood of the Lucombe Oak is of close texture and very beautiful grain, and no doubt would be very valuable for cabinet work. Some of the varieties produced from its acorns, are also, from Mr. Pine's report, likely to be well worthy of extensive culture, as they grow rapidly and will thrive in bleak exposed situations, even where the common Oak and elm do not succeed. The finest specimens of the Lucombe Oak are said to be those at Killerton near Exeter, the seat of Sir T. Dyke Acland, Bart.; noble trees of the same variety also adorn Carclew, in Cornwall, the residence of Sir Charles Lemon, Bart.





Quercus Ilex. LINN.

EVERGREEN, OR HOLM OAK.

Quercus Ilex,

LINN. sp. pl. 1412.
AITON'S Hort. Kew. v. p. 289.
NOV. DU HAM. vii. p. 156.
LOUDON'S Arb. Brit. part III. ch. cv. p. 1899.

OF the various species belonging to the evergreen section of the genus *Quercus*, the common Ilex, or Holm Oak, is

the only one that has been cultivated to any extent, or, indeed, that will grow freely throughout the greater part of the United Kingdom, for although some fine specimens of other species, as *Quer. suber* (Cork tree), *Quer. esculus*, *&c.*, do exist in the south of England and in Ireland, in warm and sheltered situations, they are of too tender a nature to brave the vicissitudes of our climate, unless thus protected, and can never become available, either as ornamental or as timber trees, in ordinary situations. Even the Ilex, in some of our very severe winters, is so far affected as to be deprived of its leaves, as was generally the case during the inclement winter of 1837-8, which proved so destructive to the evergreens and tender acclimated plants throughout the kingdom. The Ilex is a native of the southern parts of Europe, being indigenous to Italy, Spain, and the south of France, and it also extends its range into northern Africa and some parts of Asia. Its power of occupancy does not appear to be great, as it is rarely met with in forest-like masses, but dispersed here and there, singly, or in groups. It also affects maritime regions, where it always thrives with greater vigour, both in its native habitats and in Britain, than in districts removed further inland.

It is a tree of extraordinary duration, and, though its increase after a certain period is slow, it remains in a growing state for many centuries. Pliny, in his memoranda of the Ilex, makes mention of some trees growing in his time, of a greater age than Rome itself, and which at the lowest computation must at that time have been fourteen or fifteen hundred years old. Its first introduction into England appears to have been about the middle of the sixteenth century, or upwards of two hundred and sixty years ago, as it is mentioned by Gerard; and Evelyn,

in 1678, speaks of an Ilex growing in the king's privy garden at Whitehall, as "a sickly imp of more than fourscore years' growth." Since that period, as a desirable evergreen and ornamental tree, it has been planted very generally in pleasure grounds, and in many instances has attained a fine timber-like size; such are some of those mentioned by Bradly, as originally planted by Robert Ball, Esq. of Minehead, Devonshire, a late account of which is given in the eleventh vol. of the "Gardener's Magazine," and the dimensions of three of the largest are there stated. One of these was found to be eighty-five feet high, with a trunk eleven feet in circumference; the second seventy feet high, the circumference of the trunk fourteen feet; and the third, a tree inferior in height but of greater bulk, being fifty-five feet high, the circumference of the trunk as much as twenty-two feet. In the north of England, and even in Scotland, it thrives well, as may be collected from the statistics of the Ilex contained in the "Arboretum Britannicum." In Northumberland there are fine thriving specimens, of thirty and forty years' growth, at Howick, the seat of the Earl Grey, and two very fine trees at Falloden, the seat of General Sir H. Grey, of one of which our figure is a portrait; this tree is about forty-five feet high, with a trunk seven feet four inches in circumference at two feet from the ground, and a diameter of head of thirty-six feet, but it covered a much larger space previously to a storm of wind a few years ago, which tore off one of its main limbs. The other is not so high, but it covers a much larger space of ground, the diameter of the spread of the branches being upwards of seventy feet, the circumference of the bole at one foot from the ground eleven feet. Both of these trees are within the influence of the

sea breeze, and we find that at Twizell, which is similarly situated, its growth is tolerably rapid and promising. In Cornwall it is planted extensively, not only for its beauty as an evergreen, but as the best shelter upon the coast for the common as well as the Mossy-cupped Oak, and its endurance of the sea air is strongly exemplified by the healthy appearance of those planted on St. Michael's Mount. At Goodwood, near Chichester, there are many Ilex's upwards of ten feet in circumference at three feet from the ground.

The Ilex thrives best on a deep dry soil, though it also makes good progress in a stiffish loam, provided it be not wet bottomed, which is always injurious to its large deep-descending roots. It is propagated entirely by acorns, which are procured from abroad, or, in fine seasons, from trees in our own country, and the plants are either raised in beds in the open air, or in pots; we recommend the latter method, as the young trees suffer no mutilation of the root, and can at any time be turned out with a certainty of success, whereas, when raised in the open ground, they are, from the nature of their large, naked, carrot-like roots, very difficult to transplant, unless great care has been taken to move them frequently in the nursery, and thus force them to throw out lateral rootlets. Some years ago, we succeeded with scarcely the loss of a plant in transplanting a number of Holm Oaks raised from English-grown acorns; this was effected by nursing them in a stiff loam, and checking the downward direction of their roots by moving them every other year till finally transplanted. The Ilex, when left to its natural growth and fully exposed, is frequently furnished with branches from the very ground, and acquires, as Loudon remarks, the character of an immense bush, rather than that of a

timber tree. It may however, by a judicious application of the knife, be made to assume a handsome form, with a fine straight trunk, and the same effect is usually produced by planting it in company with, and allowing it to be drawn up by, other trees.

The foliage of the Ilex is of a very deep glossy green, the under surface of the leaves being more or less glaucous in different individuals. The leaves themselves vary greatly in form, and in a small seed bed we have had several distinct varieties ; in some they are large and broad, with

notched or undulated margins, in others they are prickly, like those of the common holly, and in others, again, they are narrow, with plain and, sometimes, with serrated edges. In short, the modifications of form they assume are so marked and distinct, as to have given rise to several named varieties, and it is even supposed that some of the evergreen Oaks which rank as distinct species are nothing more than varieties of the *Quer. Ilex.*

The catkins of the male flowers, which spring from the axils of the leaves of the preceding year, near to the extremity of the branches, are about one inch and a half

in length, the calyx is campanulate, the stamens six, with filaments twice the length of the divisions of the calyx. The female flowers, from four to eight in number, are sessile upon a common peduncle, which arises from the axils of the leaves of the same year, and the acorns are not ripe till the autumn of the second year. These vary in size and shape upon different trees, and the cup is closely imbricated with small scales. The acorns of the Ilex are generally harsh and bitter, and not eatable, like those of its near congener the *Quer. Grammuntia*, whose fruit is little, if at all, inferior to the finest chesnuts. The heart or matured wood of the Ilex is of a very close texture, extremely hard and heavy, weighing as much as seventy pounds the cubic foot. It is of a brown colour and takes a fine polish, but is subject to split and twist in drying. It is very durable, even when exposed to weather or the alternation of dryness and moisture; and, as its lateral and longitudinal adhesion are considerable, it possesses a flexibility sufficient to render it an excellent material for the handles of hatchets and other tools, as well as for many purposes where great strength and resistance to friction are required. Du Hamel recommends it as a ship timber, but its weight and usual want of scantling are against its employment in naval architecture. It makes an excellent and lasting charcoal, and we learn from Captain Cook's (now Widdrington) "Sketches in Spain," that in Castile the Evergreen Oaks or *Encinas** constitute the only fuel the inhabitants possess, and that the supply is rapidly decreasing from the improvident habits of the peasantry, whose practice it is "to level the whole tract which they attack. The consequence is, that there is a tolerably vigorous spring from the stocks,

* In Spain, *Encina* is the name by which the *Quer. I. Grammuntia* of authors is designated; the other species have each their distinct appellations.

this is soon cut, when a more feeble spring takes place, and is again levelled, after which operation being repeated a few times, every remnant is annihilated, and the country reduced to the open waste it now exhibits."

The bark of this species, like that of its congeners, contains a large proportion of tannin; it is thin, hard, and slightly cracked in old trees, but never corky. Upon the whole, the Ilex must be considered in this country an ornamental rather than a forest tree, though, at the same time, we would wish to recommend its adoption upon a more extensive scale than has hitherto prevailed, especially upon the sea coast, where it not only grows with vigour itself, but also serves the essential purpose of nursing and protecting other kinds of timber.

Genus *Fagus*, LINN.

LINN. *Syst. Monœcia Polyandria.*

Fagus sylvatica. LINN.

COMMON BEECH.

Fagus sylvatica,

LINN. sp. pl. 1416.
WILLD. sp. pl. iv. p. 459.
SMITH's Eng. Flor. iv. p. 152.
HOOKER's Brit. Flor. ed. III. p. 411.
MACKAY's Flor. Hibern. p. 254.
LINDL. syn. p. 239.
LOUDON's Arb. Brit. p. III. ch. cv. p. 1950.

The specific and distinguishing characters of the Beech are, leaves ovate, obsoletely serrated, and ciliated on their margins. Prickles of the outer calyx simple. Stigmas three.

The Beech is a tree of the first magnitude, frequently vieing in dimensions with the oak, the ash, and the chesnut; its usual form, when growing singly and not drawn up by other lofty trees, is that of an expansive round-headed tree, the stem, below the divarication of the greater limbs, generally short, the head crowded and composed of many branches, which at first form acute angles with the stem, but in old trees frequently bend in the middle and again curve upwards at the extremity; and it not unfrequently happens that, in close-headed trees, where the branches cross and come in contact with each other, a junction or natural inarching takes place. In mass, and growing pretty close together, it runs up to a great height, with a clean straight stem, the lower branches either dying gradually off, or so much checked in their growth as not to interfere with the cleanness of the timber.

The bark, even upon the oldest trees, is thin and smooth, and, when fully exposed to the light, of a pearl, or silvery grey colour.

The leaves are thin in texture, and, when matured, of a deep shining green; in autumn they change to a rich

orange brown, and, during the youth of the tree, are usually retained over the winter, or until the sap begins to move in the ensuing spring.

The male catkins, or barren flowers, are of a brown colour, round-stalked, and drooping; the fertile ones, placed on the branch above them, are solitary and on shorter

stalks. The calyx of the fruit is four cleft, covered with simple pliant prickles; the stigmas, three in each flower, spreading, acute, and downy. The nuts are two, each with three very sharp angles, and crowned with the inner calyx. These ripen in autumn, and generally fall from the calyx, (which bursts open at the upper extremity and remains attached to the branch,) in October and November, and are commonly known by the name of beech mast. They contain a sweet, oleaginous kernel, of pleasant flavour and not unwholesome quality, and amongst animals are a favourite food of swine, deer, badgers, squirrels and dormice, while

they are also greedily devoured by ring-doves, wood-pigeons, and pheasants. In France an excellent oil is expressed from the nuts, which is not only used for the lamp, but for culinary purposes. When carefully prepared, for which approved directions will be found in the "Arboretum Britannicum," it is said to be scarcely inferior to the best olive oil, and has that further advantage, that it produces no unpleasant smell in burning. In England, the only advantage derived from the mast is as a food for swine and poultry.

The roots of the Beech extend to a great distance, and run near to the surface, contributing, with the drip and shade of the tree, to the barrenness of the soil within their circuit.

For the first few years after planting, the Beech is of slow growth, but when once firmly rooted makes rapid progress, and in the course of seventy or eighty years, at which age it is considered to have attained its prime, is frequently from seventy to ninety, or even a hundred feet high, with a trunk as much as twelve or even sixteen feet in circumference. It continues to thrive for more than a century afterwards, and then begins to decay, which process goes on at a rapid rate, as the wood is of a more perishable nature than that of the oak and some other trees.

The Beech is generally allowed to be indigenous to England, and our oldest writers mention it as one of the four aboriginal timber trees of the island. Its limit, however, as a native, seems to be confined to the dry calcareous districts of the central parts of England, or that great ridge of chalk hills which occupies a large portion of several midland counties. In these it frequently occupies extensive tracts as a natural forest, to the exclusion

of all other kinds of timber;* for its power of occupancy, where the soil is congenial, conjoined to its deep shade and deleterious drip, is such as to prevent the interference or growth of any other tree. In Scotland and Ireland it is not indigenous, and according to Dr. Walker was not planted in any quantity in the former till between A. D. 1540 and 1560, and about the same period its first introduction into Ireland is supposed to have taken place. In both these countries, where the soil is congenial, it arrives at as great perfection and attains as great a size as it does in England, as we have ourselves observed in different parts, and as may be collected from the statistics of the Beech in the "Arboretum Britannicum."

Its distribution throughout the temperate parts of Europe is extensive, and it reaches as far north in Norway as 59°, and in Sweden to 58°. It is also found in Asia Minor, Palestine, and other Asiatic districts. On the Alps it seems that between latitudes $45\frac{1}{4}°$ and $46\frac{1}{2}°$, the line of Beeches rises to the height of 5142 feet, the snow line being 3848 feet higher; they occupy the southern slopes of the mountains, the northern of the same zone being generally clothed with the silver fir.

From the description given by Pliny of the Roman Fagus, in which the form of the nut is particularly noticed, as well as the appropriate epithets Virgil has applied to it, there is little or no doubt but that our common Beech was known in Italy by that name, although it might not have been restricted to the species; a supposition some have been led to form in consequence of the passage in "Cæsar's Commentaries," where it is said that no Fagi were found in Britain. It may also, to the readers of

* In America the Beech appears to have the same exclusive power of occupancy; the Beech forests, where they do occur, being entirely composed of this tree.

the present day, appear somewhat extraordinary that Pliny and Virgil should talk of grafting the Beech upon the Chesnut, or that the fruit of the latter should in their day be considered inferior to the mast of the Beech.

Few, we believe, who peruse the pages of "Gilpin's Forest Scenery," will be found to coincide in that author's estimate of the ornamental properties of the Beech, or who will not think that he has overlooked many circumstances, connected with this tree, which, though not exactly adapted for representation by the pencil, or wanting in those peculiar characters which are considered to constitute the picturesque, are, nevertheless, in themselves objects of interest, and calculated to produce, under certain circumstances, the most pleasing effects. It is, however, from the light in which natural objects were almost invariably viewed by the gifted author of "Forest Scenery," that we must attribute that apparent want of interest he seems to have felt and entertained towards individual objects, when not connected with the art of composition; for such was his love and admiration of the pencil, and so closely interwoven were all his feelings and associations with it, that they threw into the background, and out of view, all other qualities and accidents when these could not be made available, or were repugnant to the rules of composition.

Sir T. Dick Lauder, in his valuable edition of this author, when commenting upon the depreciating terms in which the Beech is mentioned, has well remarked, "that this is one of the instances in which the author's love of the art of painting objects of nature with the pencil, and his associations with the pleasures of that art, have very much led him away. We are disposed," he adds, "to go along with him in a great measure so far as we,

like him, draw our associations with this tree from the same source. But we conceive we have much the advantage in the pleasure arising from the contemplation of a noble Beech, as one of the most magnificent objects of God's fair creation."

To such a sentiment we give a willing assent, and though the Beech may not exhibit those characteristics which produce picturesque effect in so eminent a degree as the oak, the ash, and some other arboreal forms, still it possesses in itself many attractions and favourable accidents, whether it be in the form of a vast umbrageous tree, with a short but massive stem, such as it usually appears when growing solitary, or detached from other trees, and such as we may fancy the wide-spreading Beech of the Mantuan bard to have been; or whether it presents a straight and lofty trunk, rising amidst its neighbours like a polished column, and crowned by a canopy of the thickest foliage, such as it is when nursed and drawn up with other trees, or in company with those of its own kind, and where, as combining magnificence with beauty, it has, by an eminent writer on arboriculture, been pronounced as at once the Hercules and Adonis of our Sylva.

Whatever may be the defects of the Beech in composition, and defects we allow it to have, it possesses too many important advantages in itself to be set entirely aside, or banished from our parks and lawns. Its noble and majestic size, its umbrageous and thickly-clothed head, affording, in summer heats, a cool and welcome shade, and which, though without the tufted beauty of that of the oak, or the feathery lightness of the ash, is valuable for the depth it produces in distant scenery; the beauty of its foliage, either when matured and reflecting in gem-like coruscations, from its deep green polished

surface, every play or scintillation of light, or as it first bursts from its envelopes tender in hue and delicate in texture; the smoothness as well as the light and pleasant colour of its bark, which catches and produces those sparkling lights we so oft admire in the stems of a Beechen grove, are all of them strong and powerful recommendations in its favour, and must always counterbalance its minor defects, and those deficiencies which detract from its merits as an artist's tree.

But having thus endeavoured to vindicate the claim of the Beech to protection and favour as an ornamental tree, we are not among those who would recommend its culture on an extensive scale, even in our parks and lawns, a few being at all times sufficient to produce the desired effect; much less would we recommend it to be planted with a view to profit* in mixed plantations, particularly where it is not intended to form the ultimate crop, as from its spreading growth it is a dangerous neighbour to all others in its vicinity, particularly to the oak, and its value in a young state, or before it acquires a tolerable scantling, is so trifling as not to repay for its occupancy. Again, as a single or as a hedge-row tree it is one of the worst we can plant, for, as Matthew observes, "it is the most valueless of all timber when of small size, or when it is of short or crooked stem," which is almost invariably the case when grown singly or in hedge-rows; and it is also in the latter situation, from its dense and widely-extended shade, and the deleterious nature of its drip, more injurious to the herbage beneath than any other tree:

* In Northumberland, about fifty or sixty years ago, the Beech was extensively planted, as at that time its timber was used almost exclusively for making the train or wagon ways, belonging to the collieries. The introduction of iron rails has, however, done away with its use, and the Beechen woods are now almost valueless to their proprietors.

and here we may also remark, that one of the greatest disadvantages attending Beechen woods or groves, is, that no underwood or herbage, with the exception of some orchideous and cryptogamic plants, will thrive beneath their shade: even the hardy holly, a plant that flourishes and bears, comparatively unhurt, the drip and shade of many other trees, pines and languishes under the Beech; laurels and other evergreens, as well as deciduous shrubs, all speedily die when planted beneath its shade.

The wood of the Beech, in a green state, is hard and brittle, neither its lateral nor its longitudinal adhesion being equal to that of the oak, the ash, or the elm. When dry, it weighs about fifty pounds to the cubic foot. It possesses a heart as well as a sap wood, but the line of separation is not so visible as it is in the oak and many other trees, where the heart-wood is always of a deeper colour than the exterior or sap wood. In colour, it varies from a pale brown to white, the darkest-coloured being considered superior in quality, and the produce of the finest trees and best soil. The transverse fibres of the grain are distinctly visible, and exhibit themselves in manufactured articles, in deeper-coloured shining laminæ. Submerged, or kept constantly wet, it is very durable, and valuable for water-works, as well as for the keels and planking of vessels, for which the clean straight boles of trees that have been drawn up in company are well adapted, and recommended by Matthew. Exposed alternately to moisture and dryness, it soon rots and decays, and under cover, or kept constantly dry, no timber is more subject to be worm-eaten; articles of furniture made of Beech are generally attacked by the beetle a few years after they are made, unless protected by some process, such as varnishing, or saturating the wood with boiling

oil. It is, however, very extensively used, not only in Britain, but upon the Continent. In England, a great proportion of common furniture, such as chairs, tables, bedsteads, &c., which are usually either stained to imitate mahogany, or painted in imitation of rose, and other foreign woods, are made of Beech. It is also used for panels for carriages, and for many purposes in joinery and turnery, such as planes, screws, wooden shovels; common fowling-pieces and muskets are also stocked with it, and before cast iron came into use for wheels and pinions, cogs of Beech were greatly used.*

Within a late period, it has been in demand for rail-road sleepers, and should it prove durable and answer the purpose as well as timber of a higher marketable value, the proprietors of Beechen woods are likely to derive a large profit from what was previously unsaleable and an incumbrance upon the ground.

As a wood for fuel, the Beech is considered superior to most other trees, and upon the Continent, where mineral coal is seldom used, and more particularly in France, it is consumed to an immense extent. It evolves much heat and burns with a clear flame, in a fresh as well as in a dry state, and, in both these respects is only inferior to the sycamore and the ash, being superior to the oak in the proportion of 1540 to 1497. The charcoal it produces is of excellent quality, and in Buckinghamshire Beechen wood from coppices is charred in great quantities for the gunpowder manufactories. Upon the Continent the dead leaves, which, when dry, are of an elastic and very imperishable nature, have long been used for filling beds, for

* Loudon enumerates, among other articles, Beech staves for herring-barrels. The coopers upon the eastern coast, however, do not use them, as they will not retain the pickle used in curing the fish.

old Evelyn speaks of them in Switzerland, where, he says, "I have sometimes lain on them to my great refreshment;" and Sir T. Dick Lauder, after quoting the passage from Evelyn, and speaking of the excellence of the beds in Italy, made of mattresses filled with the elastic spathe of the Indian corn, adds, "but the beds made of Beech leaves are really no whit behind them in their qualities, whilst the fragrant smell of green tea which the leaves retain is most gratifying."

As coppice or undergrowth the Beech is not of long duration, as the shoots generally cease to push after forty or fifty years, and Buckinghamshire appears to be the only county in which coppice Beech prevails to any extent. As a hedgerow tree, we have already stated strong objections to its use, both on account of the general inferiority of its timber so situated, and the injurious quality of its shade; but for narrow upright hedges, to divide or enclose nursery grounds, gardens, or even small fields, the Beech is superior to the hornbeam, or any other deciduous tree, as it not only bears the shears equally well, and may be trained to as great a height, but retains the leaves during winter, thus affording additional shelter and warmth, and giving a richness of appearance the others do not possess. The natural soil of the Beech appears to be such as is of a dry nature, either calcareous or when mixed with sand and gravel, though it also thrives well and attains a large size upon clayey loam: indeed, provided the substratum be dry, the Beech will thrive and attain respectable dimensions upon most variety of soils. At Knowle, in Kent, where a celebrated Beech is now growing, the soil is a pure sand; and at Panmure, in Forfarshire, in a clayey loam, Sang mentions Beeches ninety feet in height, with clean trunks of fifty feet. At Twizell, upon

clayey loam, with a calcareous substratum, it grows remarkably well, and at Dunstan Hill, near Newcastle-on-Tyne, in a fine free loam, there are thriving Beeches, with boles from twenty-five to thirty or forty feet in height, many of which measure ten and twelve feet in circumference at the base.

The Beech, with the exception of the varieties, is propagated entirely by seed, and the mast or nuts are gathered when they fall from the trees, in the months of October and November. They may either be sown immediately, or, which we deem the preferable plan, mixed with dry sand till March or April, as, by sowing in spring, germination commences immediately, and they are thus more likely to escape the destructive ravages of mice and other vermin. The earth of the seed beds should be of a light nature, rich, and well pulverized, as the young plants are rather tender, and the seed should not have a covering of more than one inch. After remaining two years in the seed bed, they may be run into nursery rows, taking care not to prune or trim either the roots or stems too much; in these rows they may remain two or three years, when they will be large enough to put out, unless required of an extra size, in which case they should again be transplanted, increasing the distance between the plants and rows, according to the size it is intended the plants should attain before they are finally put out. The Beech requires to be planted by the pitting method, as the roots are numerous, and too large to be easily inserted by the slitting or T system. In a year or two afterwards, when the plants appear dead in their tops or are making little progress, it may be advisable to cut them over, either near to the ground or where a young and healthy shoot appears, and it is necessary to attend to their growth for some years

afterwards, as no tree is more liable to throw out additional or supernumerary leaders and large interfering branches than the Beech; to these the pruning-knife must be applied, but we by no means recommend that excessive pruning and denuding of the stem advocated by Pontey and other arboriculturists; on the contrary, as more consonant with the principles of vegetable physiology, we would allow most of the side branches to remain, merely thinning out where they interfered or grew too close together, or shortening in such as appeared of too rampant a growth for the other parts of the tree; for, as Matthew well observes, "In pruning, every means should be taken to increase the number of feeders, in order that none of them may become too large, and no healthy regular feeder should be lopped off till the tree has reached the required height of stem and a sufficient top above this for the purpose of growth, at which time the feeders upon the stem, as far up as this necessary height, may be removed." We would add, not entirely, but leaving a few to break the nakedness and give value to the appearance of the stem, for we are no admirers of a Pontey-like Beech, whatever merits it may have in the eyes of the timber-merchant, wood-valuer, or carpenter.

In mass, or in mixed plantations, indeed, there is little fear, from the confined situation in which they are placed, of the side branches or feeders ever attaining so large a size as to injure or interfere with the straightness and length of the bole; the difficulty, sometimes, is to keep them alive, in order that the tree may be kept in a healthy state, so as to insure a due increase of the stem. In open situations, or when standing alone, where the natural form of the Beech is that of an expansive, round-headed tree, any attempt to force it to a long, naked stem by severe

pruning with a calcareous substratum, it grows readitioned objects. Dunstan Hill, near Newcastle-on- or ought to be dug are thriving Beeches with numerary leaders, or [illegible] or forks or too exuberant a growth. The excision of two branches of the Beech, close by the bole, is always attended by bad effects, as decay is certain to extend rapidly downwards, and communicate its taint to the main body of the tree, and no branch much thicker than the arm should ever undergo close amputation.

Of the varieties of this tree, that with the deep purplish red foliage, the *Fag. S. purpurea* of the "Hort. Kew.," is one of the most remarkable and best worth cultivation, and which, when distributed sparingly and with judgement in our pleasure grounds, produces a very striking effect, from the contrast of its colour with the surrounding foliage. The original tree, which is said to be still living, was first discovered in a wood in Germany, some seventy or eighty years ago, and from it all the Purple Beeches now growing in Europe have been propagated, either by grafts or from seeds. The latter, though they frequently come true to the parent in point of colour, have also given rise to subordinate varieties, differing in the shade and intensity of the red or purple tinge, and to that more marked deviation which has received the name of the Copper-coloured Beech (*F. S. cuprea*). In England there are now fine specimens of the Purple Beech, and Loudon mentions one as the handsomest, now growing at Enville, and which, in 1831, was between sixty and seventy feet high, clothed with branches to the ground, where it extended over a space above sixty feet in diameter. There is also a variety with variegated, and another with laciniated leaves, both more curious than beautiful, and not

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